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UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA

=====

ELASTICSEARCH, INC. AND ELASTICSEARCH B.V.,

Plaintiffs,

- against -

FLORAGUNN GmbH,

Defendant.

Case Nos. 4:19-cv-05553-YGR and 4:20-cv-07514-YGR

=====

EXPERT REPORT OF DR. MARTIN WALKER

June 11, 2021

I. Qualifications

A. Educational Background

1. I received my Bachelor of Science degree in Electrical Engineering from the Massachusetts Institute of Technology in 1973. I then received my Master of Science and Doctor of Philosophy degrees in Electrical Engineering in 1976 and 1979 from Stanford University.

B. Career History

2. I have 35 years of experience in design complex software systems. In particular, I have designed built and tested software and hardware components. I also have 15 years' experience in analyzing or reverse engineering of complex software systems.

3. From 1983 to 1989, I was the founder and Chief Technical Officer at Analog Design Tools, Inc. Analog Design Tools' primary product used to design integrated circuits. I was primarily responsible for writing the original business plan, raising the venture capital necessary to launch the company, and recruiting the staff. Later, I was responsible for all technical aspects of product definition and development. My efforts were instrumental in growing Analog Design Tools, Inc., from a start-up company to a leader in the field of analog design automation.

4. From 1990 to 1994, I was a founder and Executive Vice President of Symmetry Design Systems, which specialized in software product design and consulting for the electronic design marketplace. In this role, I was instrumental in development of Symmetry's products.

5. In 1995, I founded a company called Frequency Technology (later Sequence Design) that develops EDA software for the design of advanced system-on-a-chip integrated circuits.

Sequence's products have become the de facto industry standard for parasitic extraction, circuit optimization and RTL power analysis. As Chief Executive Office, director, and Chief Scientist

at Sequence, I was involved in overseeing the development of the company's products and technologies. I also took an active role in recruiting the technical and business staff.

6. In 2000, I became the Chief Technical Officer of Knowledge Networks. Knowledge Networks was a market research company that is leveraging internet technology to revolutionize the market research industry. I managed KN's engineering group, which designed web-based systems and applications that created surveys, conducted interviews, and processed data. These systems were implemented in the Java and JavaScript programming languages. Thus I gained first-hand experience designing and deploying web-based systems such as those at issue in this matter.

7. During my consulting career, I have had the opportunity to review numerous web-based systems. In particular, I have analyzed the operation of such systems based on multiple different platforms. Specifically, I have analyzed numerous Java based applications and systems as well as systems built using JavaScript user facing source code.

8. I am named as an inventor on three patents in the field of electronic design automation. I have also published over fifty articles relating to EDA software, including technical papers in peer-reviewed journals and an invited article in International Electronic and Electrical Engineers (IEEE) Spectrum, and I have presented papers in various conference proceedings.

9. My career in consulting on technology issues in general and litigation in particular began in 2001. Since that time, I have been engaged in more than 30 projects in the field of complex software systems.

C. Publications and Prior Testimony

10. I have written over fifty articles in the fields of circuit design and design automation, including technical papers in peer-reviewed journals, an invited article in the IEEE Spectrum, and various conference proceedings. I have organized seminars and written numerous opinion

pieces published in journals such as the EE Times. I have no publications in the previous ten years, but some of my publications are listed in my CV shown as Attachment A.

11. I have previously testified at deposition and at trial in numerous matters. A complete list of all other cases in which, during the previous four years, I testified as an expert at trial or by deposition is contained in Attachment B to this report.

D. Compensation

12. Brass Rat Group, Inc. is paid \$550 per hour for my time spent on this matter. Neither my compensation, nor that of Brass Rat Group, Inc., is dependent on the outcome of this matter.

II. Assignment and Materials Considered

13. Plaintiffs in the above-captioned lawsuits, Elasticsearch, Inc. and elasticsearch B.V. (collectively, “Elastic”), have asserted claims of copyright infringement and contributory copyright infringement against defendant floragunn GmbH (“floragunn”). Elastic has alleged that the source code for floragunn’s Search Guard product (a security plugin for Elastic’s Elasticsearch and Kibana products) infringes Elastic’s copyrights in the source code for Elastic’s Elasticsearch and Kibana X-Pack and Shield security plugin products. Elastic additionally alleges that floragunn contributorily infringed Elastic’s copyrights by licensing infringing code to Amazon Web Services, Inc. (“AWS”) for use in AWS’s Amazon Elasticsearch Service (“AESS”) and Open Distro for Elasticsearch (“ODFE”) offerings.¹

14. Counsel for Elastic have asked me to examine the relevant floragunn and Elastic source code and render an expert opinion regarding whether the floragunn source code was copied from the Elastic source or is a derivative work of the Elastic source code. Counsel for Elastic have also

¹ In this report, I refer to the 19-cv-05553-YGR lawsuit as *floragunn I* and the 20-cv-07514-YGR lawsuit as *floragunn II*.

asked me to examine the relevant AESS and ODFE source code to determine whether that source code is duplicated or derived from the accused floragunn source code.

15. I base my opinions on an independent review of the parties' productions in this case, the depositions in this case, my own research, and past professional experience. The materials I have considered include:

- The pleadings in this matter;
- Source code repositories and snapshots produced by Elastic, floragunn, and AWS in this matter and publicly available source code repositories from Elastic, floragunn, and AWS;
- Documents provided in discovery by the parties and third parties;
- Depositions of Elastic and floragunn personnel; and
- Publicly available documents (e.g., documents from websites).

In addition, I had conversations with Elastic personnel: Mr. Steven Kearns (Executive Vice President of Product Management), Mr. Brandon Kobel (Principal Software Engineer), and Mr. Timothy Venum (Principal Software Engineer). A list of the documents I have considered in forming my opinions is attached as Attachment C. I have considered and may rely on all documents listed in this report and all documents listed in Attachment C.

16. The opinions in this report are based on the evidence that has been provided to me to date. To the extent that relevant new information should come to my attention, I reserve the right to amend my report, as I am allowed by the court. I am prepared to answer any questions about these opinions under oath, including at deposition and at trial.

III. Executive Summary of Opinions

17. The following paragraphs contain a summary of the opinions I give in this report. I provide the details of each opinion throughout the body of my report.

18. I analyzed each instance of floragunn source code that Elastic has accused of infringement and the corresponding source code that Elastic has alleged that floragunn infringed.

19. I considered the requirements of copyright and relevant limiting doctrines, as provided to me by counsel for Elastic. I then identified expression protected by copyright in each instance of source code that Elastic has alleged that floragunn infringed.

20. I then compared the protectable expression I identified in the relevant Elastic source code to each instance of accused floragunn source code. Based on this analysis, I formed my opinions regarding whether the accused floragunn source code is substantially similar to protectable elements of the corresponding Elastic source code. I also considered evidence of floragunn's access to Elastic's source code, and, combined with that evidence of access, formed my opinions of whether the accused floragunn source code was copied from the corresponding Elastic code. Further, I analyzed the code to form my opinions whether the accused floragunn source code is a derivative work of the corresponding Elastic source code because the floragunn source code is based on the Elastic source code and is a transformation or adaptation of that source code. I found multiple examples of copying and creation of derivative works by floragunn from the Elastic code, as set forth in detail below.

21. I also analyzed whether the similarities I identified between the floragunn and Elastic source code are qualitatively important to the floragunn source code because, where the accused floragunn source code is operative, those similarities are essential to the function of the floragunn source code. As discussed in detail below, I found multiple examples where, had those similarities been excised, the floragunn source code would not be operative for its intended purpose. I also found examples of similarities between the floragunn and Elastic code that are qualitatively important to the floragunn code because they evidence a process of copying the

Elastic source code for the purpose of adapting that source code to produce floragunn source code.

22. In addition, I analyzed whether, given the similarities I identified between the Elastic and floragunn source code, an ordinary, reasonable computer programmer would find the source code substantially similar in total concept and feel. As set forth below, I found such substantial similarity in multiple instances.

23. I further examined source code incorporated into AESS and ODFE. Within the AESS and ODFE source code, I identified instances of source code that is either identical to accused floragunn source code or based on and a transformation or adaptation of accused floragunn source code, and I conclude that such source code was duplicated or derived from the accused floragunn source code. Additionally, each instance of AESS or ODFE source code that I have identified as duplicated or derived from accused floragunn source code contains protectable elements from the relevant Elastic source code that I have traced to the corresponding accused floragunn source code.

24. This report is structured first to examine separately each instance of copyright infringement by floragunn that Elastic has alleged. The report then addresses my examination of the AESS and ODFE source code from AWS. I have also included appendices summarizing my findings regarding the AESS and ODFE source code.

IV. Background on Elastic and floragunn Products

25. I have been informed of the following facts regarding the Elastic, floragunn, and Amazon Web Services, Inc. (“AWS”) offerings relevant to this lawsuit.

26. Plaintiffs Elasticsearch, Inc. and elasticsearch B.V., along with their parent company, Elastic N.V. (collectively, “Elastic”), are the creators of the Elasticsearch software program,

which is a distributed, real-time search and analytics engine.² The Elasticsearch search engine, first released in 2010, is built on top of Apache Lucene.³ Apache Lucene is an open source Java library providing source code for indexing and search features.⁴

27. Elastic is also the creator of the Kibana software program, which is a visualization layer and management and configuration interface for Elasticsearch and other Elastic products.⁵

28. Until 2021, Elastic offered open source versions of the core portions of its Elasticsearch and Kibana products under the Apache 2.0 open source license (Elastic also offers proprietary distributions of these products).⁶

29. In January 2015, Elastic released its Shield product, which was a security plugin for Elasticsearch.⁷ Over time, Elastic added to and improved the security features in Shield, including adding document and field level security in Shield 2.0.0-beta2, released in September 2015.⁸ In October 2016, starting with the 5.0.0 release, Elastic combined Shield and several other plugins into a product known as X-Pack.⁹ There are also equivalent Shield and X-Pack products that provide security for Kibana.¹⁰ Shield and X-Pack are and have been distributed under a proprietary (i.e., non-open source) license.¹¹

30. In April 2018, Elastic made the source code for Elasticsearch and Kibana X-Pack source available.¹² To accomplish this change, Elastic moved the source code for Elasticsearch and Kibana X-Pack from private repositories into the public GitHub repositories for the underlying

² Elastic N.V. Form 10-K (June 26, 2020).

³ <https://www.elastic.co/what-is/elasticsearch>.

⁴ <https://lucene.apache.org/>

⁵ Elastic N.V. Form 10-K (June 26, 2020).

⁶ <https://www.elastic.co/pricing/faq/licensing>.

⁷ <https://www.elastic.co/blog/you-know-for-security-shield-goes-ga>. Elastic had released beta versions of Elasticsearch Shield before January 2015. (Deposition of Uri Bones 28:24-29:5.)

⁸ <https://www.elastic.co/blog/shield-and-watcher-2-0-0-beta2-released>.

⁹ <https://www.elastic.co/blog/x-pack-5-0-0-released>.

¹⁰ See <https://github.com/elastic/kibana/tree/master/x-pack>.

¹¹ <https://www.elastic.co/blog/opening-x-pack-phase-1-complete>; <https://www.elastic.co/what-is/open-x-pack>.

¹² <https://www.elastic.co/blog/opening-x-pack-phase-1-complete>; <https://www.elastic.co/what-is/open-x-pack>.

Elasticsearch and Kibana products.¹³ Despite being publicly available, the Elasticsearch and Kibana X-Pack source code was and is still distributed under a proprietary license.¹⁴

31. Since the time Elastic made the source code for Elasticsearch and Kibana X-Pack source available in April 2018, that source code has been widely distributed via Elastic's public GitHub source code repositories.¹⁵ The binaries for Elasticsearch Shield and X-Pack and Kibana Shield and X-Pack are and have been widely distributed through downloads over the internet.¹⁶

32. Search Guard is a security plugin for Elasticsearch and Kibana produced by defendant floragunn GmbH.¹⁷ Search Guard offers various security features, including document- and field-level security, that mimic the security features offered by Elastic.¹⁸ floragunn released the first version of Search Guard in 2015.¹⁹

33. In 2015, AWS launched Amazon Elasticsearch Service ("AESS").²⁰ Amazon Elasticsearch Service is a cloud-based software-as-a-service distribution of Elasticsearch and Kibana.²¹ Amazon Elasticsearch Service offers security features for Elasticsearch and Kibana using source code [REDACTED]

[REDACTED]²²

34. In March 2019, AWS released Open Distro for Elasticsearch, a free and open source distribution of Elasticsearch and Kibana that includes several plugins, including a plugin that

¹³ <https://www.elastic.co/blog/opening-x-pack-phase-1-complete>; <https://www.elastic.co/what-is/open-x-pack>.

¹⁴ <https://www.elastic.co/blog/opening-x-pack-phase-1-complete>; <https://www.elastic.co/what-is/open-x-pack>.

¹⁵ See, e.g., <https://github.com/elastic/kibana/tree/master/x-pack>; <https://github.com/elastic/elasticsearch/tree/master/x-pack>.

¹⁶ See, e.g., <https://www.elastic.co/downloads/x-pack>; <https://www.elastic.co/guide/en/shield/1.0/getting-started.html>.

¹⁷ <https://search-guard.com/faq/>.

¹⁸ <https://search-guard.com/licensing/>; <https://www.elastic.co/subscriptions>.

¹⁹ <https://search-guard.com/company/>.

²⁰ <https://aws.amazon.com/blogs/new-amazon-elasticsearch-service/>.

²¹ <https://aws.amazon.com/elasticsearch-service/>

²² May 21, 2021 Declaration of Carl Meadows.

C. Derivative Works

50. A derivative work is a work based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a derivative work. A derivative work must exist in a concrete or permanent form and must substantially incorporate protected material from the preexisting work.

51. A derivative work of a computer program may be created by deleting, modifying, or adding elements to the computer program. For example, modifying a computer program's source code to fix bugs or add features or updating or customizing a computer program may constitute creation of a derivative work.

52. A copyright owner possesses an exclusive right to create derivative works based upon a copyrighted work. Unauthorized creation of a derivative work infringes a copyright owner's exclusive right to create derivative works, and, if a third party copies a derivative work without authorization, it infringes the original copyright owner's copyright in the underlying work to the extent the unauthorized copy of the derivative work also copies the underlying work.

VI. Decompilation/Reverse Engineering

53. In a nutshell, reverse compilation refers to a (usually) automated process by which binary java class files (which are normally unreadable by developers), such as those distributed by Elastic are converted back into the java source code (which is readable by developers). This reverse compiled code can be then merged into another software product.

54. However, the reverse compilation process is not perfect. For example, source code comments are removed by the compiler in the process of creating the binary files. Accordingly, such comments are unavailable to the reverse compiler and don't appear in the reversed compiled java source code. Additionally, the java compiler can, under certain conditions, replace variables with their values. Similarly, the reverse compiled code will include the values of the variables, but not the original variable names.

55. Counsel has informed me that such unauthorized acts of reproduction and/or adaptation may violate a copyright owner's exclusive rights to reproduce the copyrighted work and prepare derivative works based on the copyrighted work.

VII. Source Code Analysis

A. getLiveDocs()

1. Overview (Background)

56. I have been informed that the copyright for the Elasticsearch source code implementing the getLiveDocs() method, referenced in paragraph 29 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on April 30, 2020 as part of Elasticsearch Shield 2.0.0 RC1.²⁵ I have been informed that the date of first publication was October 7, 2015.²⁶ The source code file DocumentSubsetReader.java implements the relevant getLiveDocs() method.²⁷ For reference, this source code file is included below. I have

²⁵ Rule 30(b)(6) Deposition of Timothy Venum ("Venum Dep.") 25:19-21; Complaint Ex. X, *floragunn II* (Dkt. 1-25).

²⁶ Complaint Ex. X, *floragunn II* (Dkt. 1-25).

²⁷ The relevant repo, version tag, commits, and filepath are specified below. I have been informed that Elastic uses tags in its git repositories to indicate versions. (Conversation with Brandon Kobel (March 18, 2021); Conversation with Timothy Venum (March 23, 2021).)

been informed that the relevant Elastic source code was authored by Martijn van Groningen, with, I am informed, Robert Muir, Adrien Grand, Shay Banon, and Jay Modi also involved.²⁸

57. I have been informed of the following facts: Elastic's `getLiveDocs()` method is part of Elastic's document level security feature.²⁹ Document level security allows an administrator of an Elasticsearch instance to specify that different sets of users should be able to see different sets of documents based on criteria set by the administrator.³⁰ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

58. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

²⁸ Venum Dep. 25:22-26:7.

²⁹ Venum Dep. 30:2-13.

³⁰ *Id.*

³¹ Conversation with Timothy Venum (June 3, 2021).

³² *Id.*

³³ Venum Dep. 42:2-8.

³⁴ Deposition of Adrien Grand ("Grand Dep.") 26:3-27:9.

³⁵ Conversation with Timothy Venum (June 3, 2021).

³⁶ *Id.*

- e. The use of and the definition of the anonymous class at floragunn lines 415-427 is copied from the Elastic code at 115-126.
- f. The fact that the code is organized to use an anonymous class is copied from the Elastic source code.
- g. The implementation of the class methods `get()` and `length()` are copied from the Elastic code.

70. I also understand that floragunn developed the accused code in a matter of weeks in response to a customer support request. Such a short development windows reinforces an inference of copying.⁴⁰

71. Based on the review above, it is my opinion that the similarities between the floragunn and Elastic code identified above are qualitatively important to the floragunn module because they are essential to the operation of the module. Had these similarities been excised, the floragunn module would not be operative for its intended purpose.

72. Additionally, based on this analysis, it is my opinion that the referenced floragunn code is substantially similar to protectable elements of the identified and copyrighted Elastic source code. Combined with evidence of access described above, it is my opinion that the floragunn code is copied from the Elastic code. Further, it is my opinion that the floragunn source code is a derivative work of the Elastic source code because the floragunn source code is based on the Elastic source code and is a transformation or adaptation of that source code.

73. In addition, it is my opinion that, given the similarities I have described between the Elastic and floragunn source code, a reasonable computer programmer would find the source code substantially similar in total concept and feel.

⁴⁰ April 27, 2021 Rule 30(b)(6) Deposition of Jochen Kressin 659:5 *et seq.*; *id.* Ex. 328.

B. numDocs()

1. Overview (Background)

74. I have been informed that the copyright for the Elastic source code implementing the numDocs() method, referenced in paragraph 31 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on April 30, 2020 as part of Elasticsearch Shield 2.0.0 RC1.⁴¹ The date of first publication was October 7, 2015.⁴² The source code file DocumentSubsetReader.java implements the relevant numDocs() method.⁴³ For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Martijn van Groningen, with, I am informed, Robert Muir, Adrien Grand, Shay Banon, and Jay Modi also involved.⁴⁴

75. I have been informed of the following facts: Elastic's numDocs() method is part of Elastic's document level security feature, which I describe above.⁴⁵ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

⁴¹ Venum Dep. 64:8-11; Complaint Ex. X, *floragunn II* (Dkt. 1-25).

⁴² Complaint Ex. X, *floragunn II* (Dkt. 1-25).

⁴³ The relevant repo, tag, filepath, and commits are specified below.

⁴⁴ Venum Dep. 64:4-7.

⁴⁵ Conversation with Timothy Venum (June 3, 2021).

⁴⁶ Venum Dep. 77:15-78:1.

⁴⁷ Conversation with Timothy Venum (June 3, 2021); Venum Dep. 71:2-6.

C. Internal Predicate

1. Overview (Background)

87. I have been informed that the copyright for the Elastic source code implementing the Internal Predicate function, referenced in paragraph 39 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on September 10, 2019 as part of Elasticsearch Shield 2.0.0-beta1.⁵¹ I have been informed that the date of first publication was August 26, 2015.⁵² The source code file `Privilege.java` implements the relevant Internal Predicate method.⁵³ For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Jay Modi and Uri Boness,⁵⁴ with, I am informed, Robert Muir as an additional contributor.⁵⁵

88. I have been informed of the following facts: The Internal Predicate function defines a set of actions that, within the framework of security conditions in which users have defined permissions to perform certain actions, Elasticsearch is permitted to perform without involvement of a user or that take place outside of the permissions of a user.⁵⁶ This function uses an `AutomatonPredicate` method to achieve that functionality.⁵⁷ The string `"internal:*"`, represents a set of many functions that are internal to Elasticsearch.⁵⁸ The string `"indices:monitor/*"`, is used by Elastic to indicate actions that operate on indices and read

⁵¹ Venum Dep. Ex. 43; Complaint Ex. J, *floragunn II* (Dkt. 1-11). Elements of this source code were introduced in the following earlier versions of Elasticsearch Shield, for which Elastic has obtained copyright registrations: (1) Elasticsearch Shield 1.0.0 Beta1, registered on April 30, 2020; and (2) Elasticsearch Shield 1.1.1, registered on September 10, 2019. (Venum Dep. Ex. 43; Elastic's Second Supplemental and Amended Response to floragunn's Interrogatory No. 4; Complaint Ex. H, *floragunn II* (Dkt. 1-9); Complaint Ex. Y, *floragunn II* (Dkt. 1-26).)

⁵² Complaint Ex. J, *floragunn II* (Dkt. 1-11).

⁵³ The relevant repo, tag, filepath, and commits are specified below.

⁵⁴ In this report, I refer to "Uri Boness" rather than "Uri Bones," because I understand that to be the preferred spelling of the name.

⁵⁵ Venum Dep. 107:20-108:20.

⁵⁶ Venum Dep. 79:12-18; 90:10-14.

⁵⁷ Venum Dep. 86:16-87:1, 90:10-14.

⁵⁸ Venum Dep. 83:13-25.

information about those indices, such as information about the health of an index (for example, whether the index has access to the copies of the documents that it is supposed to).⁵⁹ [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

89. I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn's Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic's binaries for Shield.⁶⁴ Based on my experience decompiling Java binary code it would have been technically possible for floragunn to decompile Elastic binaries to access this code and thus, through this process, floragunn would have had a reasonable opportunity to view the Elastic code.

⁵⁹ Venum Dep. 84:13-25; Conversation with Timothy Venum (June 3, 2021).

⁶⁰ Venum Dep. 85:19-86:9.

⁶¹ Venum Dep. 86:10-15; Conversation with Timothy Venum (June 3, 2021).

⁶² Venum Dep. 87:17-88:7.

⁶³ Venum Dep. 88:8-23.

⁶⁴ Boness Dep. 33:5-14.

2. Abstraction

90. For the reasons specified above, I understand that appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

91. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the scenes a faire doctrines and whether there are multiple means of expressing the ideas in this source code.

92. Among other things I considered the following potential arguments relating to filtration.

93. I found that all identified code (i.e. lines 100-106) survived this filtration step as all of the code represents original creative content that is not constrained. In particular, I note that there is no constraint on the ordering of the action list and it does not follow a logical order (e.g., alphabetical). Elastic also chose to use the automaton predicate function.

4. Comparison

94. I have identified at least the following protectable elements in the Elastic source code that are the same as those found in the floragunn source code.

95. As can be seen by inspection, the substance of lines 101-105 are the same as the commented out code in the floragunn source code file (although the floragunn source code omits Elastic comments).

96. It appears that the floragunn developer could have accessed the Elastic source code through reverse compilation. In my experience, the reverse compilation process cannot restore comments such as those present in the Elastic source code.

D. binaryField

1. Overview (Background)

103. I have been informed that the copyright for the Elastic source code implementing the binaryField function, referenced in paragraph 42 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on September 11, 2019 as part of Elasticsearch Shield 2.0.0-beta2.⁶⁶ I have been informed that the date of first publication was September 17, 2015.⁶⁷ The source code file FieldSubsetReader.java implements the relevant binaryField method.⁶⁸ For reference, this source code file is included below. I have been informed that the relevant source code was authored by Martijn van Groningen.⁶⁹

104. I have been informed of the following facts: The relevant Elastic code was added as part of a change that added document- and field-level security to Elastic's Shield product.⁷⁰ Elastic's binaryField implementation implements Shield's field-level security feature [REDACTED]

[REDACTED].⁷¹ This code makes it possible for an administrator to restrict the fields that a user is allowed to see in a document.⁷²

105. I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn's Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic's binaries for Shield.⁷³ Based on my experience decompiling Java binary code it would have been technically possible for floragunn to decompile Elastic binaries to access this code,

⁶⁶ Venum Dep. 99:2-4; Complaint Ex. K, *floragunn II* (Dkt. 1-12).

⁶⁷ Complaint Ex. K, *floragunn II* (Dkt. 1-12).

⁶⁸ The relevant repo, tag, filepath, and commits are specified below.

⁶⁹ Venum Dep. 97:15-17.

⁷⁰ Conversation with Timothy Venum (June 3, 2021).

⁷¹ Venum Dep. 99:15-25.

⁷² Venum Dep. 101:17-25

⁷³ Boness Dep. 33:5-14.

and thus, through this process, floragunn would have had a reasonable opportunity to view the Elastic code.

2. Abstraction

106. For the reasons specified above, I understand that appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

107. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the *scenes a faire* doctrines and whether there are multiple means of expressing the ideas in this source code.

3. Among other things I considered the following potential arguments relating to filtration.

108. Line 140: The `binaryField` method overrides a Lucene method of the same name. Accordingly line number 140 is not protectable.

109. Lines 144, 151 and 153: The `'if () {} else {}'` syntax is determined by the Java language and is not protectable expression. However, the choice to use this context, the Boolean expression, as well as the actions are protectable. Accordingly, the element `"SourceFieldMapper.NAME.equals(fieldInfo.name)"` of line 144 represents creative expression of the developer and is protectable content, even though the value of `SourceFieldMapper.NAME` is `"_source,"` which is from Lucene. Lucene does not require that the developer use the line 144 as a whole.

110. Lines 145-150 and 152: These lines are creative expression of the developer and are protectable content. There are no external constraints limiting the expressions of these lines.

E. `exceptionCaught()`

1. Overview (Background)

118. I have been informed that the copyright for the Elastic source code implementing the `exceptionCaught()` method, referenced in paragraph 46 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on September 10, 2019 as part of Elasticsearch Shield 1.3.0.⁷⁴ I have been informed that the date of first publication was June 24, 2015.⁷⁵ The source code file `ShieldNettyHttpServerTransport.java` implements the relevant `exceptionCaught()` method.⁷⁶ For reference, this source code file is included below. I have been informed that Jay Modi authored the relevant source code.⁷⁷

119. I have been informed of the following facts: Elastic's `exceptionCaught()` implementation is part of Elastic's SSL feature.⁷⁸ The relevant source code provides [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]⁸⁰

120. I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn's Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic's binaries for Shield.⁸¹ Based on my experience decompiling Java binaries, I know it

⁷⁴ Venum Dep. 110:9-12; Complaint Ex. I, *floragunn II* (Dkt. 1-10).

⁷⁵ Complaint Ex. I, *floragunn II* (Dkt. 1-10).

⁷⁶ The relevant repo, tag, filepath, and commits are specified below.

⁷⁷ Venum Dep. 110:7-8.

⁷⁸ Conversation with Timothy Venum (June 3, 2021).

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ Boness Dep. 33:5-14.

would have been technically possible for floragunn to decompile Elastic binaries to access this code, and that floragunn would thereby have a reasonable opportunity to view the Elastic code.

2. Abstraction

121. For the reasons specified above, I understand that appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

122. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the scenes *a faire* doctrines and whether there are multiple means of expressing the ideas in this source code.

123. Among other things I considered the following potential arguments relating to filtration.

124. Line 89: I understand that the name of the method is from OSS Elasticsearch.

Accordingly, I filtered out this name as well as the types of the arguments (ChannelHandlerContext and EventException). However, the names of the method parameters (ctx and e) are protectable expression, since they represent the developer's expression and are not otherwise constrained.

125. Line 90: The reference to lifecycle.started is protectable expression as there is no external requirement that lifecycle.started must be used in this context. Further, gating the operation of the balance of the method using the if() expresses creativity of the developer and is therefore protectable expression, since there are multiple ways of expressing this idea.

126. Line 94: Although the getCause method itself is from netty, the element Throwable t = e.getCause() is protectable expression, since there is no external constraint requiring use of the getCause method. Nor is there a requirement that the return value be stored in a local variable.

below. I have been informed that the relevant Elastic source code was authored by Court Ewing.⁹¹

- c. Elastic has alleged infringement of its `parse_next.js` source code released as part of Kibana Shield versions 5.6.7.⁹² I have been informed that the copyright for this `parse_next.js` source code, referenced in paragraph 54 of Elastic's First Amended Complaint in the *floragunn I* lawsuit, was registered with the United States Copyright Office on September 21, 2019 as part of Kibana X-Pack 5.6.7.⁹³ I have been informed that the date of first publication was January 30, 2018.⁹⁴ The relevant source code file is `parse_next.js`.⁹⁵ For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Aleh Zasytkin.⁹⁶

139. I have been informed of the following facts: Elastic's `parse_next.js` code provides functionality such that, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

⁹¹ Kobel Dep. 25:8-25:20.

⁹² First Amended Complaint ¶ 54, *floragunn I*; Complaint ¶ 55, *floragunn II*.

⁹³ Kobel Dep. Ex. 38; Complaint Ex. O, *floragunn II* (Dkt. 1-16).

⁹⁴ Complaint Ex. O, *floragunn II* (Dkt. 1-16).

⁹⁵ The relevant repo, version tag, filepath, and commits are specified below.

⁹⁶ Kobel Dep. 55:13-18, *id.* Ex. 38.

⁹⁷ Kobel Dep. 39:16-41:7.

⁹⁸ Kobel Dep. 53:22-57:2.

⁹⁹ <https://www.elastic.co/blog/kibana-5-3-1-released>; <https://www.elastic.co/blog/kibana-6-1-3-and-5-6-7-released>.

140. JavaScript is not a language that is compiled. I have been informed that Elastic makes no effort to obfuscate its JavaScript code.¹⁰⁰ Therefore, it would be easy for floragunn to review Elastic's JavaScript source code by downloading Elastic's binaries.

2. Abstraction

141. For the reasons specified above, I understand that to the extent abstraction is required, the appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

142. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the *scene a faire* doctrines and more generally whether there are multiple means of expressing the ideas involved.

143. The entirety of the protectable source code from the first two versions (2.3.2 and 5.3.1) is found in version 5.6.7. Accordingly in the analysis below, I focused on version 5.6.7. The line number references in the paragraphs below refer to version 5.6.7.

144. Among other things I considered the following potential arguments relating to filtration.

- a. I am aware that the function parse is provided with the node.js package.

Accordingly, the function name parse is not protectable in this context. However, the use of a function to parse the url as opposed to (for example) inline source code is a design choice and protectable expression.

¹⁰⁰ Conversation with Brandon Kobel (March 18, 2021)

G. call_with_request_factory

1. Overview (Background)

153. I have been informed that the copyright for the Elastic `call_with_request_factory.js` source code referenced in paragraph 57 of Elastic's First Amended Complaint in the *floragunn I* lawsuit was registered with the United States Copyright Office on November 5, 2019 as part of Kibana X-Pack 7.2.0.¹⁰¹ I have been informed that the date of first publication was June 25, 2019.¹⁰² The relevant source code file is `call_with_request_factory.js`.¹⁰³ For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Aleh Zasytkin.¹⁰⁴

154. I have been informed of the following facts: The relevant `call_with_request_factory.js` source code was added as part of a user interface for Elastic's Watcher product.¹⁰⁵ The relevant source code [REDACTED]

[REDACTED]

[REDACTED]¹⁰⁶

155. I have been informed that Elastic made the source code for X-Pack, including Kibana X-Pack, source available in April 2018.¹⁰⁷ I have been informed that Elastic's public source code repositories have been widely distributed over the internet.¹⁰⁸ I have been informed that there is

¹⁰¹ Kobel Dep. Ex. 38; Complaint Ex. R, *floragunn II* (Dkt. 1-19).

¹⁰² Complaint Ex. R, *floragunn II* (Dkt. 1-19).

¹⁰³ The relevant repo, tag, filepath, and commits are specified below. I have been informed that an earlier version of this source code was released as part of Kibana X-Pack 5.4.0, registered with the United States Copyright Office on November 5, 2019 with the first publication date of May 4, 2017. (Kobel Dep. 65:2-5; *id.* Ex. 38; Complaint Ex. Q, *floragunn II* (Dkt. 1-18). I have been informed that the authors of this earlier version of this source code were Shaunak Kashyap and Jim Unger. (Kobel Dep. 65:6-7; *id.* Ex. 38.)

¹⁰⁴ Kobel Dep. 64:20-22.

¹⁰⁵ Kobel Dep. 66:18-67:5.

¹⁰⁶ *Id.*

¹⁰⁷ Grand Dep. 114:2-6; <https://www.elastic.co/what-is/open-x-pack>.

¹⁰⁸ <https://github.com/elastic/kibana/tree/master/x-pack>.

H. `fetch_all_from_scroll`

1. Overview (Background)

169. I have been informed that the copyright for the Elastic `fetch_all_from_scroll.js` source code referenced in paragraph 60 of Elastic's First Amended Complaint in the *floragunn I* lawsuit was registered with the United States Copyright Office on November 5, 2019 as part of Kibana X-Pack 5.4.0.¹¹⁰ I have been informed that the date of first publication was May 4, 2017.¹¹¹ The relevant source code file is `fetch_all_from_scroll.js`.¹¹² For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Shaunak Kashyap or Jim Unger.¹¹³

170. I have been informed of the following facts: The relevant `fetch_all_from_scroll.js` source code allows Kibana's Watcher user interface to retrieve all watches.¹¹⁴ This source code provides functionality such that a Kibana user can see all watches through their user interface.¹¹⁵

171. I have been informed that Elastic made the source code for X-Pack, including Kibana X-Pack, source available in April 2018.¹¹⁶ I have been informed that Elastic's public source code repositories have been widely distributed over the internet.¹¹⁷ I have been informed that there is evidence of floragunn personnel accessing the X-Pack code in one of Elastic's publicly available source code repositories.¹¹⁸ The relevant accused floragunn code was committed on August 30,

¹¹⁰ Kobel Dep. Ex. 38; Complaint Ex. Q, *floragunn II* (Dkt. 1-18).

¹¹¹ Complaint Ex. Q, *floragunn II* (Dkt. 1-18).

¹¹² The relevant repo, tag, filepath, and commits are specified below.

¹¹³ Kobel Dep. 107:6-8.

¹¹⁴ Kobel Dep. 109:13-110:2; Conversation with Brandon Kobel (June 7, 2021).

¹¹⁵ Conversation with Brandon Kobel (June 7, 2021).

¹¹⁶ Grand Dep. 114:2-6; <https://www.elastic.co/what-is/open-x-pack>.

¹¹⁷ <https://github.com/elastic/kibana/tree/master/x-pack>.

¹¹⁸ April 27, 2021 Rule 30(b)(6) Deposition of Jochen Kressin 529:15-530:18; *id.* Ex. 169.

I. resolve()

1. Overview (Background)

187. I have been informed that the copyright for the Elastic source code implementing the resolve (indices) method, referenced in paragraph 21 of Elastic’s Complaint in the *floragunn II* lawsuit, was registered with the United States Copyright Office on April 30, 2020 as part of Elasticsearch Shield 1.0.0 Beta1.¹¹⁹ That copyright was registered as unpublished (the same source code was also available in subsequent versions of Elasticsearch Shield).¹²⁰ The source code file DefaultIndicesResolver.java implements the relevant resolve (indices) method.¹²¹ For reference, this source code file is included below. I have been informed that the relevant source code was authored by Luca Cavanna with additional contributions from Uri Boness.¹²²

188. I have been informed that this resolve (indices) method is part of Shield’s index-based security feature.¹²³ The relevant Elastic source code [REDACTED]

[REDACTED]

189. I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn’s Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic’s binaries for Shield.¹²⁶ Based on my experience decompiling Java binary code it would have been technically possible for floragunn to decompile Elastic binaries to access this code and

¹¹⁹ Venum Dep. 125:23-126:1; Complaint Ex. Y, *floragunn II* (Dkt. 1-26).

¹²⁰ Complaint Ex. Y, *floragunn II* (Dkt. 1-26). For example, this source code may be found as part of commit caaf7d98850fb36b17d9ca0c1c9cfc6c73a68941, which corresponds to the “shield-v1.3.0” tag.

¹²¹ The relevant repo, tag, filepath, and commits are specified below.

¹²² Venum Dep. 125:2-22.

¹²³ Venum Dep. 126:13-25, 127:5-14.

¹²⁴ Conversation with Timothy Venum (June 3, 2021).

¹²⁵ *Id.*

¹²⁶ Boness Dep. 33:5-14.

thus, through this process, floragunn would have had a reasonable opportunity to view the Elastic code.

2. Abstraction

190. For the reasons specified above, I understand that the appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

191. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the *scenes a faire* doctrines to assure that there are multiple means of expressing the idea. In general, I found the identified source code to be protectable content, with multiple means of expressing the idea, as well as not being constrained by standardized elements of software.

192. Among other things I considered the following potential arguments relating to filtration:

- a. The structure of the if () statements are filtered out, since they are constrained by the Java language. (See e.g. lines 59 and 61.) However, the boolean conditions and the actions represent protectable content.
- b. The return statement (but not the object returned) is also determined by the Java programming language and filtered out. For example, on line 69 the element “indices” is protectable.

4. Comparison

193. This section identifies protectable elements that appear in the floragunn source code. I note that the floragunn source code appears to support both indices and types, while the Elastic

J. users.html

1. Overview (Background)

198. I have been informed that the copyright for the Elastic users.html source code referenced in paragraph 28 of Elastic's Complaint in the *floragunn II* lawsuit was registered with the United States Copyright Office on September 19, 2019 as part of Kibana X-Pack 5.2.0.¹²⁷ I have been informed that the date of first publication was January 31, 2017.¹²⁸ The relevant source code file is users.html.¹²⁹ For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by C.J. Cenizal.¹³⁰

199. I have been informed of the following facts: The relevant users.html code implements Kibana's user management screens.¹³¹ This code is part of a user interface that displays a grid listing all users that exist in an Elasticsearch native realm.¹³² An example of a user management screen that is implemented using the relevant Elastic source code is included here:

¹²⁷ Kobel Dep. 85:5-8; Complaint Ex. M, *floragunn II* (Dkt. 1-14).

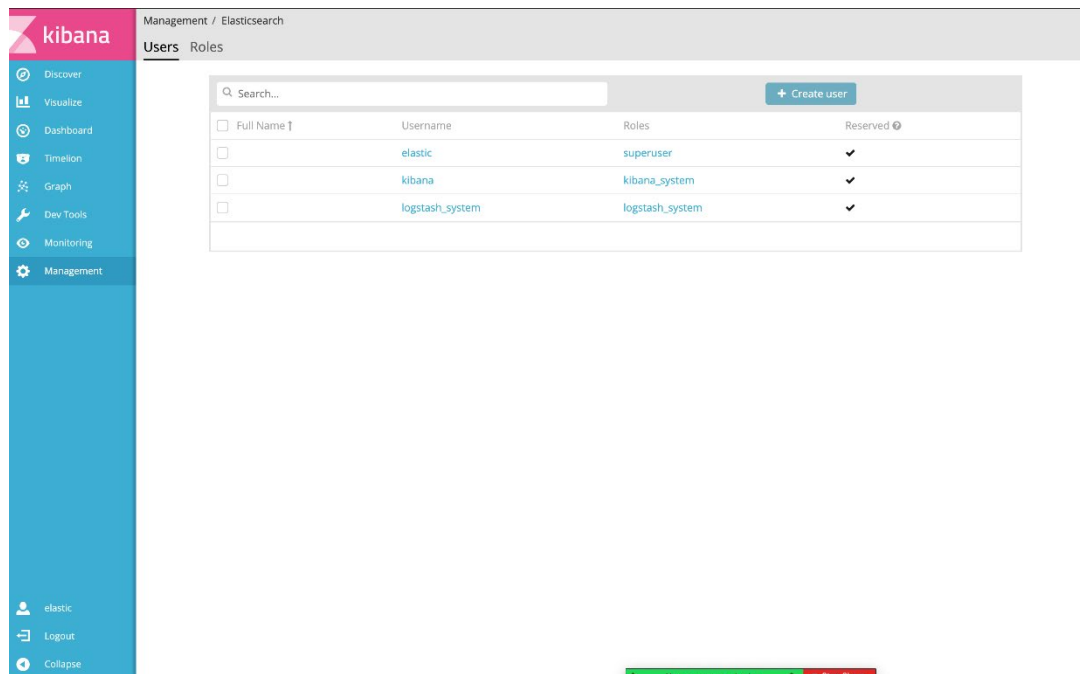
¹²⁸ Complaint Ex. M, *floragunn II* (Dkt. 1-14).

¹²⁹ The relevant repo, tag, filepath, and commits are specified below. I have been informed that an earlier version of this source code was released as part of Kibana X-Pack 5.0.0, registered with the United States Copyright Office on April 30, 2020 with the first publication date of October 26, 2016. (Kobel Dep. 85:5-8; Complaint Ex. W, *floragunn II* (Dkt. 1-24). I have been informed that the author of this earlier version of this source code was Lukas Olson. (Kobel Dep. Ex. 38.)

¹³⁰ Kobel Dep. Ex. 38; *id.* 94:19-22.

¹³¹ Conversation with Brandon Kobel (June 7, 2021).

¹³² Conversation with Brandon Kobel (June 7, 2021).



200. AngularJS extensions to HTML is not a language that is compiled. I have been informed that Elastic makes no effort to obfuscate its AngularJS extensions to HTML code.¹³³ Therefore, it would be easy for floragunn to review Elastic's AngularJS extensions to HTML source code by downloading Elastic's binaries.

2. Abstraction

201. For the reasons specified above, I understand that appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

202. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the *scene a faire* doctrines and more generally whether there are multiple means of expressing the ideas involved. Additionally I considered elements that were

¹³³ Conversation with Brandon Kobel (March 18, 2021)

K. bulk op type

1. Overview (Background)

225. I have been informed that the copyright for the Elastic source code implementing the functionality, referenced in paragraph 35 of Elastic's Complaint in the *floragunn II* lawsuit, was registered with the United States Copyright Office on October 13, 2020 as part of Elasticsearch X-Pack 5.6.0.¹³⁴ I have been informed that the date of first publication was September 11, 2017.¹³⁵ The source code file `AuthorizationService.java` implements the relevant method.¹³⁶ For reference, this source code file is included below. I have been informed that Timothy Venum authored the relevant source code.¹³⁷

226. I have been informed of the following facts: The relevant Elastic source code was added to fix an error in the X-Pack Security privilege enforcement. Under X-Pack's security

framework,

[REDACTED]

[REDACTED]. The

relevant Elastic source code was part of a fix for this error; the fix required that delete permission be explicitly granted to any users requiring this functionality.¹³⁸

227. I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn's Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic's binaries for Shield.¹³⁹ Furthermore, as I explain below, I understand that, decompilation

¹³⁴ Venum Dep. 128:21-25; Complaint Ex. U, *floragunn II* (Dkt. 1-22).

¹³⁵ Complaint Ex. U, *floragunn II* (Dkt. 1-22).

¹³⁶ The relevant repo, tag, filepath, and commits are specified below.

¹³⁷ Venum Dep. 128:14-20.

¹³⁸ <https://discuss.elastic.co/t/x-pack-security-5-6-0-and-5-5-3-security-update/100089>; Conversation with Timothy Venum (June 3, 2021).

¹³⁹ Boness Dep. 33:5-14.

can cause the Elastic source code `if`

`(action.equals(TransportShardBulkAction.ACTION_NAME))` to be rendered as

`if(action.equals("indices:data/write/bulk[s]"))`.¹⁴⁰ Accordingly, the decompiled Elastic code that appears in the accused floragunn code suggests that the decompilation processed was used by floragunn. Based on my experience with the decompilation process, it would have been technically possible for floragunn to decompile Elastic binaries to access this code, and thus through this process, floragunn would have had a reasonable opportunity to view the Elastic code.

2. Abstraction

228. For the reasons specified above, I understand that appropriate level of abstraction is the source code. Accordingly, the following analysis was performed at the source code level of abstraction.

3. Filtration

229. In this step, I identified and filtered out elements which are unprotectable. In particular I considered the merger and the scenes a faire doctrines and whether there are multiple means of expressing the ideas in this source code.

230. Among other things I considered the following potential arguments relating to filtration.

231. Line 345: Although the syntax of the `if()` statement is not original content, the expression and choice to use an `if()` statement are protectable. In particular, the element `TransportShardBulkAction.ACTION_NAME` represents protectable expression, in that the developer could have expressed the idea of comparing the value of `action` to a string differently.

¹⁴⁰ Conversation with Timothy Venum (June 3, 2021).

For example, the developer could have used while, for, if-then-else or switch statements for such testing. The developer also could have created a local method for the same purpose.

232. Lines 370-380: The syntax of the switch statement is not protectable, however, the specific actions and use of the switch expression represent choices by the developer and therefore are protectable content. The absence of a break statement is determined by the Java programming language and is not protectable content.

4. Comparison

233. As well be explained in more detail below, the referenced floragunn source code appears to have been created through a process known as “decompilation” or “reverse compilation.” I am familiar with the use of reverse compilation in general and specifically use of reverse compilation in the context of java binary files (called “java class files”). As stated above, I understand that there is evidence that, in 2015, Hendrik Saly, now floragunn’s Chief Technology Officer, told Uri Boness, then an Elastic employee, that Saly had decompiled Elastic’s binaries for Shield.¹⁴¹

234. As noted above, reverse compilation refers to a (usually) automated process by which binary java class files (which are normally unreadable by developers), such as those distributed by Elastic are converted back into the java source code (which is readable by developers). This reverse compiled code was then incorporated into the floragunn source code identified below.

235. However, the reverse compilation process is not perfect. For example, source code comments are removed by the compiler in the process of creating the binary files. Accordingly, such comments are unavailable to the reverse compiler and don’t appear in the reversed compiled java source code. Additionally, the java compiler can, under certain conditions, replace

¹⁴¹ Boness Dep. 33:5-14.

variables with their values. Similarly, the reverse compiled code will include the values of the variables, but not the original variable names.

236. Counsel has informed me that unauthorized reverse compilation comprises an act of reproduction and/or adaptation that violates a copyright owner's exclusive rights to reproduce the copyrighted work and prepare derivative works based on the copyrighted work

237. The following comparison analysis illuminates the evidence that the floragunn code was created through such a reverse compilation.

238. Compare Elastic line 345 vs floragunn Set I line 295: the Elastic code references the string "TransportShardBulkAction.ACTION_NAME" while the otherwise identical floragunn source code references the value of the string: "indices:data/write/bulk[s]". As explained above, such a replacement is indicative of reverse compilation.

239. Compare Elastic line 372 vs floragunn Set I line 394: the Elastic code uses a temporary variable named docWriteRequest, which has contextual meaning, while the floragunn source code uses the variable named ar, which does not appear to have contextual meaning. Such substitution may indicate reverse compilation.

240. Compare Elastic line 372-379 vs floragunn Set I line 395-398: the reverse compilation process does not generally preserve the order of the tests. Thus the difference in order does not rule out reverse compilation.

241. The process floragunn used to create this source code was memorialized by sequential commits to the git repository. Consequently, by examining these sequential commits, one can gain further insight into the lack of independent development of this source code. There are versions of the floragunn source code reproduced below, labeled I through IV. I understand that Elastic released the source code on Sept 11, 2017. That same day, floragunn committed the code

in Example I. However, floragunn commented out lines 390 to 406 (among others), making them non-functional.

242. On Sept 26, 2017, floragunn committed the code in Example II, which removed the comment marks that had previously made lines 390-406 in Example I non-functional.

243. On October 1, 2017, floragunn committed the code in Example III. Lines 401-409 and again commented out the code from lines 390-406 in Example I making them non-functional.

The functional code encompassing the switch statement incorporating a reference to BulkShardRequest appears to be based on the commented-out code, in that it follows the same structure and function.

244. On October 11, 2017, floragunn committed the code in Example IV. This code retained the functional code from Example III, but deleted the commented-out code originally found in lines 390 to 406 of Example I.

245. I find this sequence of commits of non-functional code to be unusual. Taken together with the proximate release of the Elastic source code and the similarities to the code, this process strongly indicates that the Elastic code formed the basis for the floragunn code, and weighs against independent development.

246. Based on the review above, it is my opinion that the similarities between the floragunn and Elastic code identified above are qualitatively important to the floragunn module because they are essential to the operation of the module. Had these similarities been excised, the floragunn module would not be operative for its intended purpose.

247. Additionally, based on this analysis, it is my opinion that the referenced floragunn code is substantially similar to protectable elements of the identified and copyrighted Elastic source code. Combined with evidence of access described above, as well as the indicia of reverse compilation, it is my opinion that the floragunn code is copied from the Elastic code. Further, it

is my opinion that the floragunn source code is a derivative work of the Elastic source code because the floragunn source code is based on the Elastic source code and is a transformation or adaptation of that source code.

248. In addition, it is my opinion that, given the similarities I have described between the Elastic and floragunn source code, an ordinary, reasonable computer programmer would find the source code substantially similar in total concept and feel.

L. Update with DLS

1. Overview (Background)

249. I have been informed that the copyright for the Elastic source code implementing the update with DLS functionality, referenced in paragraph 40 of Elastic's Complaint in the *floragunn II* lawsuit, was registered with the United States Copyright Office on October 13, 2020 as part of Elasticsearch X-Pack 5.1.1.¹⁴² I have been informed that date of first publication was December 8, 2016.¹⁴³ The source code file BulkShardRequestInterceptor.java implements the relevant Update with DLS functionality.¹⁴⁴ For reference, this source code file is included below. I have been informed that Luca Cavanna authored the source code, with contributions from Martijn van Groningen, Britta Weber, and Jay Modi.¹⁴⁵

250. I have been informed that the relevant Elastic source code prevents users who have document or field level security enabled [REDACTED]

[REDACTED].¹⁴⁶

251. I have been informed that Elastic made this code for Update with DLS source available in April 2018.¹⁴⁷ I have been informed that Elastic's public source code repositories have been widely distributed over the internet.¹⁴⁸ I have been informed that there is evidence of floragunn personnel accessing the X-Pack code in one of Elastic's publicly available source code repositories.¹⁴⁹ The relevant accused floragunn code was committed on June 7, 2018. Thus,

¹⁴² Venum Dep. 141:18-20; Complaint Ex. T, *floragunn II* (Dkt. 1-21). I have been informed that an earlier version of this code released on November 24, 2015 as part of Elasticsearch Shield 2.0.1, which Elastic registered with the United States Copyright Office on October 13, 2020. (Venum Dep. 142:22-143:5; Complaint Ex. S, *floragunn II* (Dkt. 1-20).) I have been informed that Martijn van Groningen authored this earlier version of the source code. (Venum Dep. 142:22-25.)

¹⁴³ Complaint Ex. T, *floragunn II* (Dkt. 1-21).

¹⁴⁴ The relevant repo, tag, filepath, and commits are specified below.

¹⁴⁵ Venum Dep. 141:14-142:2.

¹⁴⁶ Venum Dep. 143:9-14.

¹⁴⁷ Grand Dep. 114:2-6; Conversation with Timothy Venum (June 3, 2021).

¹⁴⁸ <https://github.com/elastic/elasticsearch/tree/master/x-pack>.

¹⁴⁹ April 27, 2021 Rule 30(b)(6) Deposition of Jochen Kressin 529:15-530:18; *id.* Ex. 169.

M. DLS add Alias

1. Overview (Background)

265. I have been informed that the copyright for the Elastic source code implementing the DLS add Alias functionality, referenced in paragraph 43 of Elastic's Complaint in the *floragunn II* lawsuit, was registered with the United States Copyright Office on October 13, 2020 as part of Elasticsearch X-Pack 6.1.1.¹⁵⁰ I have been informed that the date of first publication was December 19, 2017.¹⁵¹ The source code file `IndicesAliasesRequestInterceptor.java` implements the relevant DLS add Alias functionality.¹⁵² For reference, this source code file is included below. I have been informed that Jay Modi authored the relevant source code.¹⁵³

266. I have been informed of the following facts: Within Elasticsearch, an alias functionality allows an index node to be referred to be one or more names.¹⁵⁴ Within the X-Pack security framework, a user's security privileges may be different depending on the name of the index.¹⁵⁵ The relevant Elastic source code prevents users who have document or field level security restrictions from [REDACTED]

[REDACTED]¹⁵⁶

267. I have been informed that Elastic made this code for DLS add Alias source available in April 2018.¹⁵⁷ I have been informed that Elastic's public source code repositories have been widely distributed over the internet.¹⁵⁸ I have been informed that there is evidence of floragunn

¹⁵⁰ Venum Dep. 148:23-25; Complaint Ex. V, *floragunn II* (Dkt. 1-23).

¹⁵¹ Complaint Ex. V, *floragunn II* (Dkt. 1-23).

¹⁵² The relevant repo, tag, filepath, and commits are specified below.

¹⁵³ Venum Dep. 148:21-22.

¹⁵⁴ Venum Dep. 150:23-151:25.

¹⁵⁵ *Id.*

¹⁵⁶ *Id.*

¹⁵⁷ Grand Dep. 114:2-6; Conversation with Timothy Venum (June 3, 2021).

¹⁵⁸ <https://github.com/elastic/elasticsearch/tree/master/x-pack>.

N. `secure_saved_objects_client`

1. Overview (Background)

285. I have been informed that the copyright for the Elastic `secure_saved_objects_client.js` source code referenced in paragraph 46 of Elastic’s Complaint in the *floragunn II* lawsuit was registered with the United States Copyright Office on September 21, 2019 as part of Kibana X-Pack 6.4.0.¹⁶⁰ I have been informed that the date of first publication was August 23, 2018.¹⁶¹ The relevant source code file is `secure_saved_objects_client.js`.¹⁶² For reference, this source code file is included below. I have been informed that the relevant Elastic source code was authored by Larry Gregory and Brandon Kobel.¹⁶³

286. I have been informed of the following facts: In Kibana, a “saved object” stores data for future use.¹⁶⁴ For example, visualizations, dashboards, and saved queries may all be considered “saved objects.”¹⁶⁵ The relevant source code provides role-based access controls to limit user access to saved objects.¹⁶⁶

287. I have been informed that Elastic made the source code for X-Pack, including Kibana X-Pack, source available in April 2018.¹⁶⁷ I have been informed that Elastic’s public source code repositories have been widely distributed over the internet.¹⁶⁸ I have been informed that there is evidence of floragunn personnel accessing the X-Pack code in one of Elastic’s publicly available source code repositories.¹⁶⁹ The relevant accused floragunn code was committed on June 4,

¹⁶⁰ Kobel Dep. Ex. 38; Complaint Ex. P, *floragunn II* (Dkt. 1-17).

¹⁶¹ Complaint Ex. P, *floragunn II* (Dkt. 1-17).

¹⁶² The relevant repo, tag, filepath, and commits are specified below.

¹⁶³ Kobel Dep. 90:20-23.

¹⁶⁴ Kobel Dep. 86:15-87:9.

¹⁶⁵ Kobel Dep. 86:15-87:9.

¹⁶⁶ Conversation with Brandon Kobel (June 7, 2021).

¹⁶⁷ Grand Dep. 114:2-6; <https://www.elastic.co/what-is/open-x-pack>.

¹⁶⁸ <https://github.com/elastic/kibana/tree/master/x-pack>.

¹⁶⁹ April 27, 2021 Rule 30(b)(6) Deposition of Jochen Kressin 529:15-530:18; *id.* Ex. 169.

317. My opinions regarding duplication of protectable Elastic source code and creation of derivative works from protectable Elastic source code for each instance of AEES and ODFE source code listed in my “AWS Elasticsearch Service SSRV Analysis,” “AWS Elasticsearch Service Search Guard SSL Analysis,” or “Open Distro for Elasticsearch Analysis” appendices are the same as my opinions regarding the corresponding accused floragunn source code discussed in my report.

IX. Signature

By: 

Dr. Martin Walker

Date: June 11, 2021

ATTACHMENT A

Martin G. Walker, PhD

Consultant Curriculum Vitae

Expertise

IC Design

- EDA Software
- Digital circuit design and simulation
- Analog IC design and analysis
- Analog circuit design
- RF and microwave circuit design

Source Code

- Identification of copied source code
- Analysis of copied source code
- Analysis of alleged trade secret misappropriation
- Patent infringement of source code
- Copyright infringement of source code, including database schemas

Contact Information:

Brass Rat Group, Inc.
2225 E. Bayshore Rd, Suite 200
Palo Alto, CA 94303

www.brassratgroup.com
mwalker@brassratgroup.com
650-331-0200

Litigation Experience

Dr. Walker has testified in jury trials and arbitration involving software technology issues, including testifying in federal court and the ITC on matters relating to infringement and validity of various patents as well as misappropriation of trade secrets. He has been engaged as a “technology neutral” to assist in the resolution and adjudication of electronic discovery issues. Dr. Walker is particularly adept at explaining complex technology issues to lay audiences and, as such, has often been asked to present Markman tutorials and prepare demonstratives for arguments as well as his testimony. He regularly works with attorneys to help articulate and manage the many technology issues that arise in complex litigation.

Industry Experience

Dr. Walker is a recognized expert with over 40-years of experience in design of integrated circuits, including analog, digital and RF/microwave circuits. His analog IC circuit design experience includes analog components such as PLLs, voltage regulators/controllers and linear systems. In the digital IC design Dr. Walker has experience at the circuit level, including such structures as ESD components, level shifters, sense amps, SDRAM circuits such as DDR sequencing circuits and On-Die Termination (ODT). His RF/Microwave design experience includes microwave components (such as amplifiers, oscillators, mixers and switches) as well as sub-systems (tuners, low-noise down converters, etc).

Martin G. Walker, PhD

Consultant Curriculum Vitae

Dr. Walker has over 25 years experience in electronic design automation (EDA) software systems, simulation and circuit design and modeling. He is a recognized expert in the field of EDA systems, simulation, and modeling. He also has experience with the design of digital and analog IC, with verilog and VHDL analysis, synthesis of digital ICs such as flash memory controllers, analyses and verification of metal interconnects and related process technology.

During his consulting career, Dr. Walker has gained experience with smart-phone applications and system-level programming and integration with underlying hardware. For example, he has analyzed operation of Android and iOS systems to determine their functionality and analyze whether the functionality meets the claim limitations of cellular technology patents. For example, he has analyzed WiFi and cellular data communications, including the interfaces between the handset operating system and the WiFi and cellular chip sets.

Additionally, Dr. Walker has analyzed the operation of cellular modems, including hardware, firmware, and software to determine the operation of the modems as they related to various 3GPP, CDMA2000, and LTE cellular communication standards.

During the course of his practice, Dr. Walker has analyzed such diverse code as EDA software, VoIP software, database schema, mail-list processing software, speech-recognition systems and stock-brokerage software. He is familiar with a wide variety of source-code repositories including CVS, RCS, Subversion, Perforce, and Rational ClearCase.

Dr. Walker has also performed numerous analyses of systems-on-a-chip. The operation of such ICs is often defined by a combination of hardware and software. The hardware is usually specified at the RTL level in Verilog or VHDL. This hardware is often controlled by software running on an embedded processor, such as an ARM. He has been asked to understand, analyze, and document the operation of the system in the context of patent infringement or (in the case of potential prior art) invalidity. For example, he has investigated implementation of signal processing algorithms that implement 3GPP cellular telephone standards on baseband modem ICs.

Martin G. Walker, PhD
Consultant Curriculum Vitae

Litigation Projects

Matter	Sequence Design vs various defendants
Description	Patent infringement – pre-litigation investigation (EDA Software)
Law Firm	Thelen Reid
Client	Sequence Design
Status	Settled
Dates	2000-02
Matter	Silvaco v CSI
Description	Misappropriation of Trade Secrets; source code analysis (EDA Software)
Law Firm	Dechert, LLP
Client	Silvaco
Status	Settled
Dates	2001-03
Testimony	Multiple depositions; Testified at arbitration; Testified at trial
Matter	IRS v Taxpayer
Description	Analysis for tax purposes of EDA software valuation and associated royalty streams. Provided expert report.
Law Firm	FTI Teklicon (for IRS)
Client	IRS
Status	Completed
Dates	2001-02
Matter	Synopsys vs Nassda
Description	Patent infringement; misappropriation of trade secrets (EDA Software). Provided expert report and declarations. Analyzed evidence of electronic document spoliation.
Law Firm	Dechert LLP
Client	Synopsys
Status	Settled
Dates	2001-04
Testimony	Deposition
Matter	Aprés v Ho
Description	Misappropriation of trade secrets related to EDA software
Law Firm	Law offices of Al Reynaldo (for cross-defendant Après)
Client	Aprés
Status	Settled
Dates	2003
Testimony	Trial
Matter	HCL vs eKomas

Martin G. Walker, PhD

Consultant Curriculum Vitae

Description	Analysis and identification of directly copied source code written in a web-host scripting language. The product at issue is a web-based application for loan management.
Law Firm	Dechert
Client	HCL
Status	Settled
Dates	2003-04
Matter Description	Tera Systems vs InTime Software Patent infringement related to EDA software. Researched invalidity and supported claim construction.
Law Firm	McDermott
Client	InTime Software
Status	Settled
Dates	2004
Matter Description	Siliconix vs AATI Patent infringement regarding method for manufacturing a semiconductor device. Support for claim construction and invalidity analysis. Researched prior art.
Law Firm	Dechert LLP
Client	AATI
Status	Settled
Dates	2004-05
Matter Description	Berry vs Fleming, et al. Source code copyright and misappropriation of trade secrets of an SQL database schema as well as associated source code. Reviewed source code at issue. Provided expert report relating to software development, non-infringement of copyright, and analysis of forensic data to refute claims of electronic evidence spoliation.
Law Firm	Kirkland
Client	Flemming and other Defendants
Status	Completed - Summary judgment of non-infringement of copyright for more than 90% of potential damages. Jury verdict awarding minimal damages for balance of claims.
Dates	2005
Matter Description	Synopsys vs Magma Theft of IP relating to EDA software as well as patent infringement in two venues. Analyzed Magma software written mostly in C++ for infringement identified historical software supporting invalidity of Magma patents. Provided support for claim construction and invalidity analysis.
Law Firm	Dechert/Wilson Sonsini
Client	Synopsys

Martin G. Walker, PhD

Consultant Curriculum Vitae

Status	Settled.
Dates	2005
Matter	Keywords vs ISE
Description	Investigated allegations of source code copying and copyright infringement of source code written in an interpreted language similar to perl. Declaration ISO of opposition to preliminary injunction.
Client	ISE
Status	Settled.
Dates	2005
Matter	Experian v. I-Centrix
Description	Investigating allegations of source code copying and misappropriation of trade secrets. The code was originally written in Fortran, but then translated into the C programming language. Performed analysis of electronic data that suggested evidence tampering on the part of defendants. Expert Report documenting identification of literal copying of source code as well as copied algorithms. Also identified methods the defendants used in an attempt to disguise the misappropriated code and algorithms.
Law Firm	Jones Day
Client	Experian
Status	Settled.
Dates	2005-06
Testimony	Deposition
Matter	FIS v. CalAmp
Description	Investigation of alleged misappropriation of trade secrets. Performed investigation and created expert report regarding the alleged misappropriation.
Law Firm	Gordon Rees
Client	CalAmp
Status	Settled.
Dates	2006
Matter	LiveOps v. Teleo
Description	Misappropriation of trade secrets, copyright infringement of VoIP software systems. Investigation to detect software copying.
Law Firm	Gordon Rees
Client	LiveOps
Status	Settled.
Dates	2006

Martin G. Walker, PhD
Consultant Curriculum Vitae

Matter	Matsushita v. MediaTek
Description	Patent infringement investigations (invalidity, claim construction, infringement) relating to various patents, including design techniques and DFM technology. Provided expert report regarding infringement and validity of the patents at issue. Expert report on infringement and validity of DFM patent related to processing of metallization structures
Law Firm	Dewey Ballantine
Client	Matsushita
Status	Settled.
Dates	2006
Testimony	Markman Tutorial and Deposition
Matter	Apple Resellers et al v. Apple Computer
Description	Technology neutral appointed by Judge Jacobs May in Superior Court of Santa Clara to resolve the parties disputes regarding proper production of electronic documents. Presentation to the Court to explain the technology and issues relating to the electronic production by the various parties.
Status	Settled.
Dates	2006
Matter	iSmart International v I-Docsecure
Description	Plaintiffs allege that Defendants misrepresented certain technology in the context of an equity investment. Investigated to determine facts; provided declaration regarding business practices and lack of factual basis for claims. Source code at issue was written in a web-host scripting language.
Law Firm	Paul Hastings
Client	I-Docsecure
Status	Settled.
Dates	2006
Matter	Microsoft vs BWT Industry Technology
Description	Provided expert opinion regarding alleged pirating of Microsoft products.
Law Firm	Gordon Rees
Client	BWT Industry Technology
Status	Settled.
Dates	2006

Martin G. Walker, PhD
Consultant Curriculum Vitae

Matter	Benedict v Mediatracc
Description	Expert testimony at a jury trial regarding standard level of care relating to IT practices.
Law Firm	Greenan, Peffer
Client	Mediatracc
Status	Jury award for Defendant.
Dates	2006
Testimony	Deposition and Trial

Matter	ST vs SanDisk
Description	Patent infringement regarding semiconductor design techniques and ESD circuits. Investigation in support of claim construction and non-infringement analysis.
Law Firm	Jones Day
Client	Mediatracc
Status	Settled
Dates	2006

Matter	Matsushita v. MediaTek
Description	Patent infringement investigations (validity, claim construction, infringement) relating to various patents, including phase-lock loop design.
Law Firm	McDermott Will & Emery
Client	Matsushita
Status	Settled
Dates	2006-07

Matter	Silvaco vs BindKey, et al
Description	Analysis and declarations regarding misappropriation of Silvaco trade secrets, including forensic analysis of hard disk drives used by defendants. The source code was written in C++.
Law Firm	Deschert
Client	Silvaco
Status	Settled
Dates	2006

Matter	Shore Venture Group v Authentidate
Description	Source code analysis.
Law Firm	Buchanan Ingersoll
Client	Shore Venture Group
Status	Settled
Dates	2007

Matter	Panpacifics v Tradebeam
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Martin G. Walker, PhD
Consultant Curriculum Vitae

Description	Selected as an independent expert to assist the arbitration panel with technology issues
Status	Settled
Dates	2007
Matter	Shareholders v Magma
Description	Documented facts relating to the technical aspects of false and misleading statements made by Magma. Provided technical consulting service to plaintiffs counsel to explain the scope and nature of the Defendants acts. Expert report addressed industry-standard software coding practices and level of care relating to possible misappropriation of trade secrets by employees, misappropriation of trade secrets
Law Firm	Millberg Weiss
Client	Shareholders
Status	Settled
Dates	2007
Matter	BHE Group v MTS Products
Description	Analysis of expert testimony; investigation relating to performance of computers
Law Firm	Miller Barondess
Client	BHE Group
Status	Closed. Jury award in excess of \$45,000,000 for client, BHE
Dates	2007
Testimony	Deposition; Jury trial
Matter	HP v Acer
Description	Retained as testifying expert. Analyzed ICs regarding infringement of Acer's circuit design patents. Analyzed and documented infringement of several different ICs. Research included on-site inspections of IC designs using owner-supplied design tools to demonstrate infringement.
Law Firm	Dechert
Client	Acer
Status	Settled
Dates	2007
Matter	Variphy, Inc. et al, v Clarus Systems, Inc.
Description	Investigate alleged misappropriation of trade secrets and source code copying of VoIP telephony and related applications.
Law Firm	Bergeson, LLP
Client	Clarus
Status	Settled
Dates	2008

Martin G. Walker, PhD

Consultant Curriculum Vitae

Matter	Sandisk v various Flash memory manufacturers
Description	Retained as consulting expert responsible for analyzing flash memory controller products for possible infringement of SanDisk patents. Analyzed the detailed design of various products and prepared infringement analyses. Support depositions of technical personnel and experts.
Law Firm	Wilson Sonsini
Client	Sandisk
Status	Closed
Dates	2008
Matter	Web.com v Go Daddy
Description	Prepared and presented claim construction tutorial explaining the background technology for 4 web-hosting related patents
Law Firm	Wilson Sonsini
Client	Sandisk
Status	Closed
Dates	2008
Testimony	Markman tutorial explaining technology for the web-hosting patents at issue.
Matter	On Semiconductor v Samsung
Description	Retained as testifying expert. Performed research to determine infringement and validity of four patents. Three of the patents related to circuits; one related to metallization systems. Prepared expert reports regarding infringement and validity. Prepared declarations in support of various discovery motions. Prepared Markman tutorial for all patents at issue. Assisted attorneys in deposition of Samsung's expert and other technology witnesses.
Law Firm	Jones Day
Client	On Semiconductor
Status	Settled
Dates	2007-08
Testimony	Deposition
Matter	Ricoh v Synopsys
Description	Consulting expert. Prepared technology tutorial. Researched and assisted in preparation of a Motion for Summary Judgment for non-infringement and reply.
Law Firm	Wilson Sonsini
Client	Synopsys
Status	Summary Judgment in favor of Synopsys
Dates	2008-09

Martin G. Walker, PhD

Consultant Curriculum Vitae

Matter	Spansion v Samsung (ITC and District Court actions)
Description	Consulting expert. Provide analysis and discovery advice on evidence needed to demonstrate infringement of the patents at issue.
Law Firm	King and Spalding
Client	Spansion
Status	Closed
Dates	2009
Matter	Toshiba Medical v. Stubitsch
Description	Testifying expert. Provided expert report and declarations relating to the sufficiency of Toshiba trade secrets descriptions and their misappropriation. Analyzed and responded to motions regarding the particularization of the trade secrets.
Law Firm	Ford Marrin Esposito
Client	Toshiba Medical
Status	Closed
Dates	2009
Matter	Data Treasury v Wells Fargo, et al
Description	Testifying expert. Provided expert report relating to non-infringement of patents by Bancorp South in this extensive litigation in Eastern District of Texas. Reviewed documents and plaintiff expert reports. Developed and documented several bases for non-infringement.
Law Firm	Andrews Kurth
Client	Defendant Bancop South
Status	Closed
Dates	2009
Matter	LSI Logic/Agere vs Xilinx, Inc
Description	Consulting expert responsible for four patents relating to design software and logic circuits. Prepared Non-infringement analyses/invalidity analyses. Examined circuits as possible prior art
Law Firm	Jones Day
Client	Xilinx
Status	Closed
Dates	2009-10
Matter	On Semi v Hynix, Elpida, and Nanya
Description	Retained as testifying expert. Performed research to determine infringement and validity of five patents. Four of the patents related to circuits; one related to methods of programming flash memory systems.
Law Firm	Perkins-Coie
Client	On Semi
Status	Closed
Dates	2009-10

Martin G. Walker, PhD

Consultant Curriculum Vitae

Matter	Red Bend Software v Google
Description	Testifying expert. Analyzed part of the Chrome browser software accused by Red Bend of infringing a Red Bend patent. Analyzed Red Bend infringement contentions and the browser component at issue. Prepared expert declaration supporting Google's opposition to motion for preliminary injunction. Supported attorneys in preparing oral arguments for Summary Judgment hearing.
Law Firm	Bingham McCutchin
Client	Google
Status	Concluded. Summary judgment in favor of Google
Dates	2009
Testimony	Deposition
Matter	2kDirect v. Azoogle Ads
Description	Testifying expert. Researched issues relating to proper practice by companies engaged in technology due diligence. Provided expert report documenting my opinions.
Law Firm	Cotchett, Pitre & McCarthy
Client	2kDirect
Status	Closed
Dates	2010
Testimony	Deposition
Matter	Scratch DJ LLC v Activision Publishing
Description	Identify source code implementing the asserted trade secrets. Determine if and to what extent defendant used misappropriated source code. Project involved code comparison between code bases in the presence of considerable third party source code.
Law Firm	Duffy Sweeney
Client	Scratch DJ LLC
Status	Closed
Dates	2010
Matter	Volterra v Primarion
Description	Testifying expert for matters relating to the validity or certain Volterra patents. The patents describe integrated semiconductor power switches and their implementation in silicon. My task involved review of the implementation of the devices and the efforts to copy those devices by the defendants. I provided an expert report and testified at deposition.
Law Firm	Farella Brown
Client	Volterra
Status	Closed
Dates	2010
Testimony	Deposition

Martin G. Walker, PhD
Consultant Curriculum Vitae

Matter	Panasonic v Freescale
Description	Testifying expert in the ITC matter. Review the asserted claims of the patent at issue. Determined if the claims were infringed by certain of the Defendant's designs. Provided expert report relating to claim construction and infringement. Testified at deposition. The patent relates to IC design and manufacturing in general, and more particularly to the patterns of metal interconnects on the designs.
Law Firm	White Case
Client	Panasonic
Status	Closed
Dates	2010
Testimony	Deposition
Matter	Nuance v Vlingo
Description	Testifying expert regarding infringement and validity of speech recognition methods and devices. Analyzed source code and documented evidence of infringement. Considered alleged prior art and identified missing elements. The accused products are web-based speech to text software systems written in C++ and Java programming languages. Authored expert reports concerning infringement and validity.
Law Firm	Irell Manella
Client	Nuance
Status	Closed
Dates	2011
Testimony	Deposition and jury trial testimony regarding infringement and validity. Judge Zobel encouraged the jury to pose questions directly to me, which they did on several occasions.
Matter	Rambus v Freescale, et al
Description	Investigation relating to DDR2 memory interface and high speed serial interfaces, and possible defenses as well as documenting substantial non-infringing use. Created expert report documenting findings.
Law Firm	K&L Gates
Client	ST Microelectronics
Status	Closed
Dates	2011
Testimony	Deposition.

Martin G. Walker, PhD
Consultant Curriculum Vitae

Matter	Freescall v. ChipMos
Description	Testifying expert regarding scope of licensed patents relating to a defense of patent exhaustion. Compared the scope of patent licenses granted in two contracts. Drafted expert report.
Law Firm	Jones Day
Client	Freescall
Status	Closed
Dates	2011
Testimony	Deposition.
Matter	Richtek v uPI
Description	Testifying expert regarding use of misappropriated trade secrets and elements of certain third party graphics board designs in an ITC enforcement action. Conducted an investigation relating to the Respondent's continued use of Richtek intellectual property. Drafted two expert reports and witness statements. Testified at the hearing.
Law Firm	Alston Bird
Client	Richtek
Status	Closed
Dates	2011
Testimony	ITC Hearing and Deposition.
Matter	Brown v TPL
Description	Testifying expert relating to misappropriation of trade secrets asserted by TPL against Brown. Investigated nature of the trade secrets and whether Brown had identified protectable trade secrets as well as evidence of misappropriation of the trade secrets. Testified at the jury trial.
Law Firm	GCA Law
Client	Brown
Status	Jury award for client Brown
Dates	2011-12
Testimony	Jury Trial and Deposition
Matter	Samsung v Apple
Description	Testifying expert relating to operation of baseband modem ICs that implement the 3GPP standard. Investigated hardware and firmware source code written in VHDL, Verilog, and C languages. Determined the signal coding and decoding in various ICs as compared operation to Samsung's alleged "standard-essential" patents. Drafted expert report.
Law Firm	Wilmer Hale
Client	Apple
Status	Closed
Dates	2012
Testimony	Deposition

Martin G. Walker, PhD
Consultant Curriculum Vitae

Matter Description	I-V vs Hynix Testifying expert on infringement and validity of patents relating to design of certain DDR3 memory products. Investigation included analysis of circuit schematics for DDR3 memories. Provided expert reports supporting validity and infringement
Law Firm	Weil Gotshal
Client	Intellectual Ventures
Status	Closed
Dates	2011-12
Testimony	Deposition
Matter Description	SST Corp. v. eSilicon Corp Testifying expert on matters relating to misappropriation of IC design trade secrets and standard industry practices regarding licensing of silicon IP. Provided expert report.
Law Firm	Fenwick
Client	eSilicon
Status	Closed
Dates	2012
Testimony	Deposition
Matter Description	InterDigital v (Cell phone suppliers including Huawei and ZTE) Testifying expert relating to the operation of certain Android cell phones and the operation of the baseband modem ICs. Investigation including analysis of Android source code as well as the source code and HDL of the baseband modem. Provided expert reports
Law Firm	Wilson Sonsini
Client	InterDigital
Status	Closed
Dates	2012-13
Testimony	ITC Hearing; Deposition.
Matter Description	Dynetix v Synopsys Testifying expert on infringement of patents related to simulation of integrated circuits. Investigation included analysis simulator source code. Provided expert report.
Law Firm	Orrick
Client	Synopsys
Status	Closed
Dates	2012
Testimony	Deposition.
Matter Description	AMCC v Sandforce, LSI Logic et al Testifying expert the process of IC design, particularly as it relates to the design of processors.

Martin G. Walker, PhD

Consultant Curriculum Vitae

Law Firm	Gibson Dunn
Client	AMCC
Status	Closed
Dates	2013
Testimony	Deposition
Matter	Skyhook v Google
Description	Research the operation of handset location determination systems. Compared the operation to various patent claims for the purposes of determining infringement as well as whether certain prior-art systems meet the claim limitations. Provided expert reports relating to non-infringement and inventorship.
Law Firm	Steptoe and Johnson/Keker-Van Nest
Client	Google
Status	Closed
Dates	2011-2015
Testimony	Deposition
Matter	British Telecom plc v Google, Inc
Description	Research regarding non-infringement of two mobile data related patents and the operation of Google servers as well as components of the Android OS. Prepared expert reports relating to non-infringement by Google.
Law Firm	White Case
Client	Google
Status	Closed
Dates	2012-2014
Testimony	Deposition
Matter	Mortgage Grader v Costco
Description	Patent infringement. Analyzed operation of web-based application relating to anonymous pricing of mortgages. Created expert report describing the multi-tiered application.
Law Firm	TechKnowledge Law Group
Client	Mortgage Grader
Status	Closed
Dates	2014
Testimony	Deposition
Matter	Norman IP v Lexmark et al
Description	Patent Infringement relating to processor architecture of controllers used in communication modules used in the MBZ products. Researched non-infringement and invalidity.
Law Firm	Sherman & Sterling
Client	MBZ
Status	Closed

Martin G. Walker, PhD

Consultant Curriculum Vitae

Dates	2013-14
Matter Description	SnapOn v Bosch Patent Infringement of software and hardware for wheel alignment systems. Research related to determining infringement.
Law Firm	Grippio & Elden
Client	SnapOn
Status	Closed
Dates	2012-14
Matter Description	Monster LLC Covered Business Method (CBM) review. Prepared invalidity analysis of two patents relating to web based methods for job searching and matching. Prepared declarations in support of the petitioner.
Law Firm	Dechert
Client	Monster LLC
Status	Closed
Dates	2014
Matter Description	HSM v. Fujitsu, et al. Patent Infringement by Micron memory specific analog and digital gate and transistor level circuits. Created tutorial and provided declarations in support of claim construction. Analyzed operation of accused devices. Provided expert reports supporting invalidity and non-infringement
Law Firm	Weil Gotshall
Client	Micron
Status	Closed
Dates	2013-2016
Testimony	Deposition
Matter Description	UnWired Planet v Apple Patent infringement by Apple server and client side software relating to speech recognition and location services.
Law Firm	Gibson Dunn
Client	Apple
Status	Closed
Dates	2013-14
Testimony	Presented Markman tutorial for all patents at issue.
Matter Description	InterDigital v Nokia Patent infringement relating to the operation of certain Android cell phones and the operation of the baseband modem ICs. Investigation including analysis of Android source code as well as the source code and HDL of the baseband modem.

Martin G. Walker, PhD

Consultant Curriculum Vitae

Law Firm	Wilson Sonsini/Latham
Client	InterDigital
Status	Closed
Dates	2013
Testimony	Testified at deposition and at ITC hearing.
 Matter	 InterDigital v Samsung
Description	Patent infringement relating to the operation of certain Android cell phones and the operation of the baseband modem ICs. Investigation including analysis of Android source code as well as the source code and HDL of the baseband modem.
Law Firm	Wilson Sonsini/Latham
Client	InterDigital
Status	Closed
Dates	2013
Testimony	Testified at deposition.
 Matter	 Realtek v LSI Logic
Description	Patent infringement and validity relating to the physical layout and performance of certain IC devices. Prepared expert reports and witness statements relating to infringement and validity.
Law Firm	Reed Smith
Client	Realtek
Status	Closed
Dates	2012-2014
Testimony	Testified at deposition and at the ITC evidentiary hearing.
 Matter	 Newell et al. v Yapstone et al.
Description	Investigation of the operation of a web-based application, including the software architecture, performance, and details of the operation. Provided expert report.
Law Firm	Valorem Law
Client	Newell
Status	Closed
Dates	2014-2015
Testimony	Testified at deposition
 Matter	 XimpleWare, Inc. v Versata et al
Description	Investigation related to infringement of XimpleWare open source software licensed through the GNU copyright. Expert report detailed the scope of infringement and efforts by Defendants to remove the allegedly infringing source code.
Law Firm	Valorem Law
Client	Versata
Status	Closed
Dates	2014-2015

Martin G. Walker, PhD

Consultant Curriculum Vitae

Matter	Oracle America, Inc. v Terix et al
Description	Investigation relating to the extent of alleged copyright infringement by the defendants relating to Sun Solaris software and firmware.
Law Firm	GCA Law
Client	Terix/Maintech
Status	Closed
Dates	2015
Matter	Lenovo et al v Personal Audio
Description	Investigation relating to personal music player patent held by Personal Audio. Research prior art, including source code analysis. Prepared Declaration supporting Petitioner's IPR
Law Firm	White Case
Client	Google
Status	Closed
Dates	2015
Testimony	Deposition
Matter	ATopTech v Synopsys
Description	Supported Patent Owner's response to IPR review of a Synopsys patent relating to static timing analysis. Researched and prepared declaration in support of Patent Owner's final response.
Law Firm	Jones Day
Client	Synopsys
Status	Closed
Dates	2014-2015
Testimony	Deposition
Matter	Synopsys v ATopTech
Description	Investigation relating to Synopsys claims of copyright infringement relating to ATopTech's use of Synopsys commands and output formats in their tool. Documented the extent of the infringement, prepared declarations.
Law Firm	Jones Day
Client	Synopsys
Status	Closed
Dates	2014-2016
Matter	Verizon et al v Orlando Communications
Description	Investigation relating to aspects of Android OS. Prepared Declaration supporting Petitioner's request for re-exam of two Orlando Patents. Examinations were instituted in full.
Law Firm	Keker Van Nest
Client	T-Mobile

Martin G. Walker, PhD
Consultant Curriculum Vitae

Status	Closed
Dates	2015-2016
Matter	Xilinx v McCubrey
Description	Investigation relating to design of FPGAs. Prepared Declaration supporting Petitioner's request for re-exam of two McCubrey Patents.
Law Firm	Haynes Boone
Client	Xilinx
Status	Closed
Dates	2015
Matter	NFC Technology v Samsung Electronics Co. LTD.
Description	Investigation relating aspects of NFC communications in Samsung mobile phones. Investigated operation of devices during various NFC communications modes.
Law Firm	Finnegan
Client	NFC Technologies
Status	Closed
Dates	2015-2016
Matter	WTS Paradigm, LLC v EdgeAQ, LLC.
Description	Investigation to alleged misappropriation of EdgeAQ trade secrets relating to window and door configuration software. Investigated and reviewed the partys' source code and software configuration management systems to determine the extent of the alleged misappropriation
Law Firm	Foley and Lardner LLP
Client	EdgeAQ
Status	Closed
Dates	2015-2016
Matter	AVM v Intel
Description	Confidential investigation relating to non-infringement by Intel of AVM patent. The asserted claims relate to transistor-level circuits inside Intel processors. I investigated the design flow, analyzed circuits and the design tools that supported circuit design.
Law Firm	Wilmer Hale
Client	Intel
Status	Closed
Dates	2015-2018
Matter	Intellectual Ventures v Ricoh Americas Corp.

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Description	Investigation to alleged infringement of two patents relating to design of printer and scanner hardware. Performed prior art investigation relating to the invalidity of the IV patents. Testified at deposition.
Law Firm	Orrick
Client	Ricoh
Status	Closed
Dates	2016
Matter	CCE v AT&T
Description	Investigation related to alleged infringement by MAC-layer LTE communications.
Law Firm	Paul Hastings
Client	AT&T
Status	Closed
Dates	2016-2017
Matter	Raytheon v Cray.
Description	Investigation as to alleged infringement of two patents related to software based job scheduling in multiprocessor environments. Provided expert report.
Law Firm	Steptoe & Johnson
Client	Raytheon
Status	Closed
Dates	2016-2019
Testimony	Deposition
Matter	NXP v NFC Technology
Description	Declaration in support of patent owner's response to IPR of a patent relating to aspects of NFC communications in Samsung mobile phones. Investigated claimed prior art and motivation to combine the art with NFC communication modalities.
Law Firm	Finnegan
Client	NFC Technologies
Status	Completed
Dates	2017
Matter	R2 v Intel
Description	Confidential investigation relating to non-infringement by Intel of R2 patent. The asserted claims relate to circuit components inside Intel processors. I investigated the design flow, analyzed circuits and the design tools that supported circuit design.
Law Firm	Wilmer Hale
Client	Intel
Status	Completed
Dates	2017

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Matter	British Telecom v Valve, Inc
Description	Investigation relating to non-infringement and invalidity of patents asserted by BT relating to email delivery, text messages, on-line purchasing and screen sharing. Reviewed prior art and operation of Valve's Steam online gaming platform.
Law Firm	Pillsbury/Barceló Harrison
Client	Valve
Status	Completed
Dates	2017
Matter	Apple
Description	Confidential investigation related to patents reading on RF and microwave transistor level circuits.
Law Firm	Haynes Boone
Client	Apple
Status	Completed
Dates	2017
Matter	Qualcomm v Apple
Description	Investigation relating to LTE modem circuits regarding patents asserted in an ITC investigation
Law Firm	Wilmer Hale
Client	Apple/Intel
Status	Closed
Dates	2017-2018
Matter	Attia v Google
Description	Investigation relating to misappropriation of building architectural trade secrets. Investigation involves operation of Google source code
Law Firm	Wilson Sonsini
Client	Google
Status	Closed
Dates	2017-2021
Matter	Compulife Software vs One Resource Group
Description	Investigation and report relating to alleged misappropriation of trade secrets and copyright infringement by third parties users of a web-based application.
Law Firm	Berger-Singerman
Client	ORG
Status	Complete
Dates	2017

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Consultant Curriculum Vitae

Matter	Uchytel v Avande et al
Description	Investigation relating to alleged false claims made by Avande in relation to a software CRM-based system. Analysis involves identification of allegedly copied source code as well as more generally the provenance of the applications source code.
Law Firm	Kirkland
Client	Avande/Accenture
Status	Closed
Dates	2017-2018
Matter	GeoSolutions v GyPSii
Description	Investigation relating to use of certain location related APIs
Law Firm	Squire Patton Boggs
Client	GeoSolutions
Status	Closed
Dates	2018-2019
Testimony	Arbitration hearing in Beijing; Arbitration hearing in Amsterdam
Matter	Red Rock Analytics v Samsung Electronics
Description	Investigation relating validity of US Patent 7,346,313. The technology relates to calibration of I-Q balance in RF transceivers
Law Firm	Heim Payne & Chorush
Client	Red Rock Analytics
Status	Closed
Dates	2018-2019
Matter	Unity Opto
Description	Declarations in support of patent owner's response to <i>Ex Parte</i> re-exams of 4 LED driver related patents
Law Firm	Alston Bird
Client	Unity Opto
Status	Completed
Dates	2018
Matter	Xilinx
Description	Declaration in support of Petition for IPR of a patent related to memory controllers in the context of reconfigurable computing
Law Firm	Haynes Boone
Client	Xilinx
Status	Completed
Dates	2018
Matter	IV vs T-Mobile, Sprint

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Description	Investigation related in non-infringement and invalidity of LTE patents. Prepared declarations in support of IPR petition. Expert reports related to noninfringement and patent comparability.
Law Firm	Kwun Bhansali Lazarus
Client	T-Mobile, Sprint
Status	Closed
Dates	2018-2019
Testimony	Deposition
Matter	E-Systems v Mentor
Description	Investigation relating to validity and infringement of E-Systems patent in the field of IC design software
Law Firm	Burns Charest LLP
Client	E-Systems
Status	Closed
Dates	2018
Matter	T-Q Delta v 2-Wire
Description	Investigation and source code analysis of DSL modem firmware across three patent families. Analysis in support of non-infringement.
Law Firm	Goodwin Procter
Client	2-Wire
Status	Closed
Dates	2018-2020
Testimony	Deposition, jury trial
Matter	Midwest Athletics v. Ricoh
Description	Investigation related to invalidity and noninfringement of certain printer software patents
Law Firm	Jones Day
Client	Ricoh
Status	On going
Dates	2018-present
Matter	Motorola Solutions v Hytera
Description	Investigation related to source code copying, trade secret misappropriation. Reviewed source code related to digital radio implementations.
Law Firm	Kirkland & Ellis
Client	Motorola Solutions
Status	Closed
Dates	2018-2019

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Matter	VLSI v Intel
Description	Confidential investigation relating to non-infringement by Intel of patents assigned to VLSI. The asserted claims relate to circuit components inside Intel processors. I investigated the design flow, analyzed circuits and the design tools that supported circuit design.
Law Firm	Wilmer Hale
Client	Intel
Status	On going
Dates	2018-present
Matter	Traxcell v Sprint
Description	Investigation related in non-infringement of cellular-network patents. Prepared expert report related to noninfringement and patent comparability.
Law Firm	McGuire Woods
Client	Sprint
Status	Closed
Dates	2018-2019
Matter	Liion v. Vertiv
Description	Investigation relating to misappropriation of Battery Management System software trade secrets.
Law Firm	Benesch, Friedlander
Client	Vertiv
Status	On going
Testimony	Deposition
Dates	2019-present
Matter	Elastic v. floragunn
Description	Investigation related to software copyright infringement of search software.
Law Firm	O'Melveny & Meyers
Client	Elastic
Status	On going
Dates	2019-present
Matter	Lexmark International v Universal Imaging Industries, LLC
Description	Investigation related to patent infringement of software and hardware technologies for laser printing supplies. Testifying expert on matters related to infringement
Law Firm	Banner & Witcoco
Client	Lexmake
Status	On going

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Dates	2019-present
Matter Description	Gree, Inc v Supercell OY Investigation related to patent infringement of gaming software technology.
Law Firm	Fenwick
Client	Supercell
Status	Closed
Dates	2020-2021
Matter Description	Singular Computing LLC v. Google Patent infringement investigation relating to special purpose computing hardware.
Law Firm	Keker Van Nest & Peters
Client	Google
Status	On going
Dates	2020-present
Matter Description	OnePoint Solutions, LLC et al v MPAY, Inc. Investigation related to software copyright infringement of payroll software.
Law Firm	Morse
Client	MPAY
Status	On going
Testimony	Deposition
Dates	2020-present
Matter Description	HEALTHeSTATE v United States and ASM Research Investigation related to federal claims, involving copyright claims of a health care software system.
Law Firm	Covington
Client	Defendants
Status	On going
Dates	2021-present
Matter Description	Ericsson IPRs Expert testimony relating to invalidity of patents reading on cellular base stations.
Law Firm	Haynes Boone
Client	Petitioner
Status	On-going
Dates	2021-present

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Matter	Monarch Networking v cisco Systems
Description	Infringement of networking patents related to IPV4-IPV6 transition
Law Firm	Heim, Payne & Chorusch
Client	Plaintiffs
Status	On-going
Dates	2020-present

Matter	Parus v Google
Description	IPR analysis relating to validity of patents readingweb-based applications
Law Firm	Wolf, Greenfield & Sacks
Client	Petitioner
Status	Closed
Dates	2021

Confidential Assignments

2019-Present	Non-testifying litigation consultant for confidential company in networking industry
2019	Non-testifying litigation consultant for confidential company in printing industry
2014-2020	Non-testifying litigation consultant for confidential company in semiconductor packaging industry
2010-2014	Non-testifying litigation consultant for confidential company in EDA software industry

Employment History

From:	2001	Brass Rat Group, Inc.
To:	Current	Woodside, CA
Position:		<i>CEO</i>

Brass Rat Group is a successful Silicon Valley based consulting organization specializing in litigation consulting and business consulting in the semiconductor (IC) design field. Dr. Walker provided litigation support and expert analysis for plaintiff Synopsys in Synopsys vs Nassda, which was recently settled resulting in a “significant victory” for Synopsys.

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From: 2000
To: 2001
Position: **Knowledge Networks**
Menlo Park, CA
Chief Technology Officer
Knowledge Networks is a pre-IPO market research company that is leveraging internet technology to revolutionize the market research industry. KN recruited a panel of over 50,000 consumers to be interviewed on a variety of topics weekly. Dr. Walker managed KN's engineering group, which designed and created automated systems to create surveys, conduct interviews, process data, and manage the panel. He also managed the IT group which was responsible for high-availability web-based systems for fielding the interviews as well as the internal systems required to analyze the data and produce real-time reports.

From: 1995
To: 2000
Position: **Sequence Design (Formerly Frequency Technology)**
Founder, Founding CEO, Director & CTO
Sequence Design, formerly Frequency Technology, is the leader in the EDA segment called Design Closure. Sequence's products and services, consisting of pre- and post-layout optimization based on accurate layout extraction, enable designers to bring higher performance, lower-power integrated circuits quickly to tape out. Dr. Walker:

- Developed business plan and raised over \$9MM in financing;
- Hired staff and led development, including defining technical product definition; Personally developed many of the basic algorithms, which resulted in five issued patents;
- Led initial marketing efforts;
- Wrote numerous technical articles advancing the company's technical position;
- Served as chief technical spokesman for the company.

From: 1990
To: 1995
Position: **Symmetry Design Systems**
Los Altos, CA
Founder, Director & Executive Vice President
Symmetry, a self-funding enterprise, was a service and product business specializing in the analog simulation EDA market. Products included simulation-model libraries, modeling tools, and special-purpose analog simulators. Dr Walker was responsible for a joint venture in Beijing China, where new products were developed. Symmetry was acquired by Analogy, Inc.

- Initiated Japanese and European marketing activities.
- Developed conceptual framework and user-interface model for the Sun OpenLook-based product.
- Served as technical spokesman in customer and industry forums.

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- Conducted sales training in the US, Asia, and Europe.

From: 1983
To: 1990
Position:

Analog Design Tools

Sunnyvale, CA

Founder, Director, Founding CEO & Chief Scientist

ADT's first product, the Analog WorkBench, pioneered the market for Analog CAE workstations, including such fundamental concepts as multiple window CAE systems, and simulated test instruments as a paradigm for CAE user interface. ADT, which had grown to \$16MM in annual sales and 150 employees, was acquired by Cadence.

- Formulated original business plan and presented concept to venture investors. Raised initial venture financing. Led fund-raising activities through the series C round.
- Served as President during formative stage. Director and Chief Scientist (CTO) from the founding through acquisition. Set the product direction. Drove the technology development.
- Formulated ADT's initial marketing strategy. The international distribution strategy focused primarily on Japan.
- Developed the Japanese market for ADT's products. Responsible for establishing and maintaining our distributor relationship, negotiating contracts, supporting customers, and building sales that amounted to 20% of the installed base.

From: 1980
To: 1983
Position:

COMSAT

Palo Alto, CA

Director, Microwave Systems

Managed a Navy sponsored program to develop high productivity techniques for manufacturing of microwave components. Developed a microwave circuit-synthesis product.

From: 1973
To: 1980
Position:

Watkins-Johnson

Palo Alto, CA

Member of the Technical Staff

Developed GaAsMESFET-based microwave amplifiers, components, and tuners. Designed and produced the world's first GaAsMESFET amplifiers to be delivered in production quantities.

Consulting History (within last 5 years)

From: 2005
To: 2007
Duties:

Sequence Design
Santa Clara
EDA software analysis

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From: 2005 **Sabio Labs**
 To: 2006 Palo Alto, CA
 Duties: Created business plan, operating plan, and marketing plan for EDA startup focused on analog circuit optimization and synthesis

From: 2005 **Synopsys, Inc**
 To: 2012 Mountain View, CA
 Duties: Technology investigations relating to IP issues. Presented technology overview to non-technical staff

Patents

<u>Patent Number</u>	<u>Date Issued</u>	<u>Title</u>
6,643,831	2003	Method and system for extraction of parasitic interconnect impedance including inductance
6,381,730	2002	Method and system for extraction of parasitic interconnect impedance including inductance
5,901,063	1999	System and method for extracting parasitic impedance from an integrated circuit layout

Education

<u>Year</u>	<u>College/University</u>	<u>Degree</u>
1987	AEA/Stanford Executive Institute	Completed w/distinction
1979	Stanford University, Stanford, CA	Ph.D., Electrical Engineering
1976	Stanford University, Stanford, CA	MS, Electrical Engineering
1973	Massachusetts Institute of Technology, Boston, MA	BS, Electrical Engineering

Publications

Over fifty articles in the fields circuit design and design automation, including technical papers in peer-reviewed journals, an invited article in the IEEE Spectrum, and various conference proceedings. I have organized seminars, which were designed to enhance the technical credibility of my companies, and written numerous opinion pieces published in journals such as EETimes that served to establish and promote our corporate position. Some more recent publications are listed below.

Martin G. Walker, Modeling the Wiring of Deep Submicron ICs, IEEE Spectrum Vol 37, No. 3, March 01, 2000 at pp. 65-71.

Martin G. Walker, Keh-Jeng (KJ) Chang, Christopher J. Bianchi, SIPP's Why Do We Need a New Standard for Interconnect Process Parameters? VLSI: Systems on a Chip, Kluwer Academic Publishers, December, 1999.

Martin Walker, Timing Errors Haunt Interconnects, Electronic Engineering Times No. 1021, August 17, 1998.

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Martin Walker, Interconnect Analysis Must Move to 3-D, Electronic Engineering Times No. 980, November 10, 1997.

Martin G. Walker, The Guardband Crisis, Electronic Engineering Times No. 929 November 25, 1996 at p. 43.

In addition to the foregoing, I also submitted opinion pieces to Integrated Systems Design (May 1997), Electronic Business (April 1998), and EE Times (June, July, and September 1998).

Professional Associations and Achievements

- 1999 Fortune Magazine “Cool Company” for Frequency Technology.
 - 1984 Electronic Products New Product of the Year award for the Analog Workbench
 - 1976 IEEE Microwave Applications award recognizing contributions to the design of GaAsFET amplifiers.
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ATTACHMENT B

RECENT TESTIMONY
OF
MARTIN G. WALKER, PhD

- *Matsushita v MediaTek* (testified at deposition and presented *Markman* tutorial for Matsushita) Case No. C 05-CV-3148-MMC US District Court, Northern District of California, San Francisco Division
- *BHE Group v MTS Products* (testified at trial for BHE) Superior Court of the State of California for the County of Los Angeles Case No.: EC 041097
- *Benedict v Mediatrac* (testified at trial for Mediatrac) Superior Court of the State of California for the County of Contra Costa Case No.: C 06-00028
- *Web.com v Go Daddy* (presented *Markman* tutorial for Go Daddy) Civil Action No. CV07-01552-PHX-MHX US District Court, District of Arizona
- *ON Semiconductor v Samsung* (testified for ON Semiconductor) Civil Action No. 1:06-cv-00720-JJF US District Court, District of Delaware
- *Red Bend Software v Google* (testified for Google) Civil Action No. 09-cv-11813-DPW US District Court, District of Massachusetts, Eastern Division
- *2kDirect v Azoogle Ads* (testified for 2kDirect) Civil Action No. 08-03340 VBF (PLAx) US District Court, Central District of California
- *Volterra v Primarion* (testified for Volterra) Case No. C 08-05129 JCS US District Court, Northern District of California, San Francisco Division
- *Panasonic v Freescale* (testified for Panasonic) ITC Investigation No. 337-TA-716
- *FSL v ChipMos* (testified for FSL) Case No.: 5:09-CV-03689-JF-PSG
- *Nuance v Vlingo* (testified at the trial for Nuance) Case No 1:09-cv-11414-RWZ
- *Richtek v uPI* (testified at the hearing for Richtek) ITC Investigation No. 337-TA-698
- *Brown v TPL* (testified at trial for Brown) Case No.: 1-09-CV-159452
- *Apple v Samsung* (testified for Apple) Case No.: 11-CV-01846-LHK
- *Intellectual Ventures v Hynix Semiconductor, et al* (testified for Intellectual Ventures) Case No.: 1:10-cv-1066 (SLR-MPT) (US District Court, District of Delaware)
- *Silicon Space Technology v eSilicon* (testified for eSilicon) Cause No.: D-1-GN-11-001750 (District Court of Travis County, Texas)
- *InterDigital v Nokia, et al* (testified at the hearing for InterDigital) ITC Investigation No. 337-TA-800
- *Realtek v LSI Logic* (testified for Realtek) ITC Investigation No. 337-TA-859

- *Synopsys v Dynetix* (testified for Synopsys) Case No. 5:11-cv-05973-PSG (US District Court, Northern District of California)
- *InterDigital v Samsung* (testified for InterDigital) ITC Investigation No. 337-TA-868
- *British Telecom v Google* (testified for Google) Case. No. 11-1249 (LPS) (US District Court, District of Delaware)
- *InterDigital v ZTE and Nokia* (testified for InterDigital) Cases. No. 13-0009 and -0010 (RGA) (US District Court, District of Delaware)
- *Synopsys, Inc. v Mentor Graphics Corporation* (testified for Synopsys) Case No. 3:12-cv-06467-MMC (US District Court, Northern District of California)
- *SKYHOOK WIRELESS, INC. v GOOGLE INC.* (testified for Google) Case 1:10-cv-11571-RWZ and Case No. 1:13-cv-10153-RWZ (US District Court, District of Massachusetts)
- *Mortgage Grader, Inc. v Costco et al* (testified for Mortgage Grader) Case No. 2:13-cv-00043 AG (AN) (US District Court, Central District of California)
- *Newell, et. al v Yapsone, Inc. et al* (testified for Newell) Case No. C13-00081 (California Superior Court, County of Contra Costa)
- *Lenovo et al v Personal Audio, Inc* (testified for Petitioner) IPR examination of US Patent Nos 6,199,076 and 7,509,178 Case IPR2015-00845 and -00846
- *ATopTech v Synopsys* (testified for Patent Owner) IPR examination of US Patent 6,237,127 Case No IPR2014-01145
- *Synopsys v ATopTech* (testified for Synopsys) Case No 3:13-cv-02965 MMC (DMR)
- *HSM v Fujitsu et al* (testified for Micron, Inc.) Case No. 11-cv-00770-RGA
- *Intellectual Ventures v Ricoh* (testified for Ricoh) Case No. 13-CV-474 (SLR) (District of Delaware)
- *WTS Paradigm, LLC, v EdgeAQ, LLC.* (testified for EdgeAQ) Case No. 3:15-cv-00330-wmc (Western District of Wisconsin).
- *Raytheon Company v. Cray, Inc.* (testified for Raytheon) Civil Action No. 2:15-cv-1544-JRG-RSP (Eastern District of Texas, Marshall Division).
- *GeoSolutions B.V. v Sina Corporation* (testified for GeoSolutions) Netherlands Arbitration Institute Case 4427, Amsterdam, The Netherlands
- *GeoSolutions Holdings N.V. v Sina Hong Kong, Limited* (testified for GeoSolutions) China International Economic and Trade Arbitration Commission (CIETAC) No. V20170719 Beijing, China
- *Intellectual Ventures v Sprint, T-Mobile* (testified for Defendants) Civil Action No. 2:17-cv-662-JRG and 2:17-cv-661-JRG (Eastern District of Texas, Marshall Division).

- *TQ Delta, LLC. v 2Wire, Inc.* (testified for 2Wire) Civil Action No. 13-cv-1835-RGS (District of Delaware).
- *Traxcell Technologies, LLC. v Sprint Communications Co, et al* (testified for Sprint) Civil Action No. 2:17-cv-00719-RWS-RSP (Eastern District of Texas, Marshall Division)
- *Midwest Athletics and Sports Alliance LLC. v. Ricoh USA, Inc.* (testified for Ricoh) Civil Action No. 2:19-cv-00514-JDW (Eastern District of Pennsylvania)
- *Liion, LLC. v Vertiv Group Corporation* (testified for Vertiv) Civil Action No.18-cv-6133 (Northern District of Illinois, Eastern Division)
- *Monarch Networking Solutions, LLC. v Cisco Systems, Inc.* (testified for Monarch) Civil Action No.2:20-cv-00015 (Eastern District of Texas, Marshall Division)
- *Google LLC, et al v Parus Holdings* (testified for Google) IPR2020-00846 and IPR2020-00847